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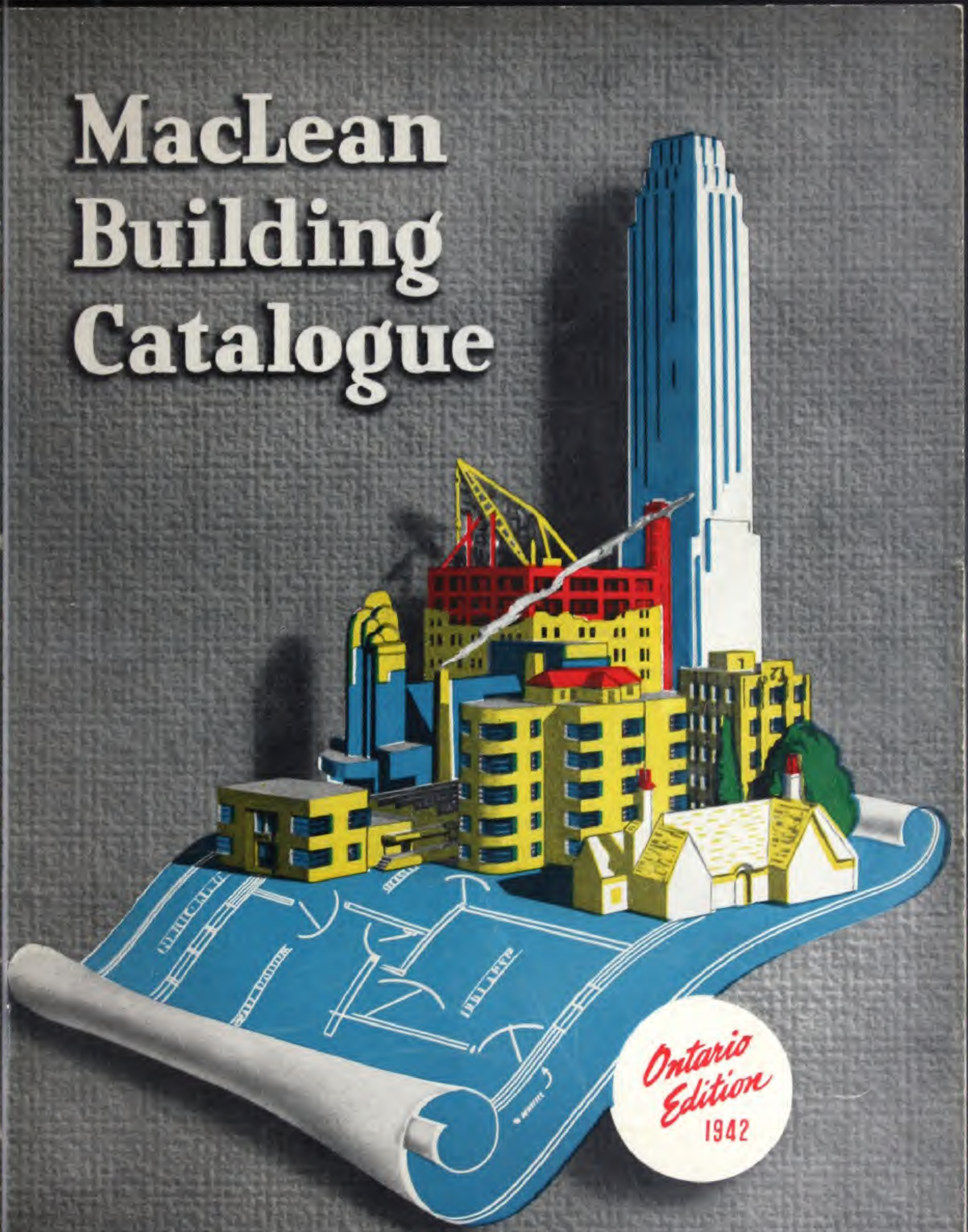

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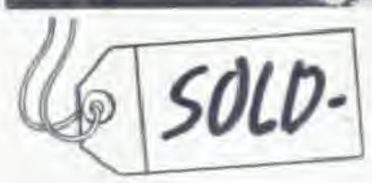

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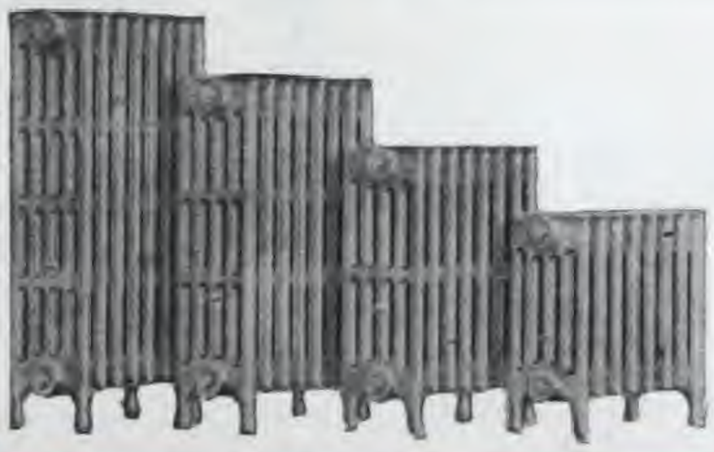

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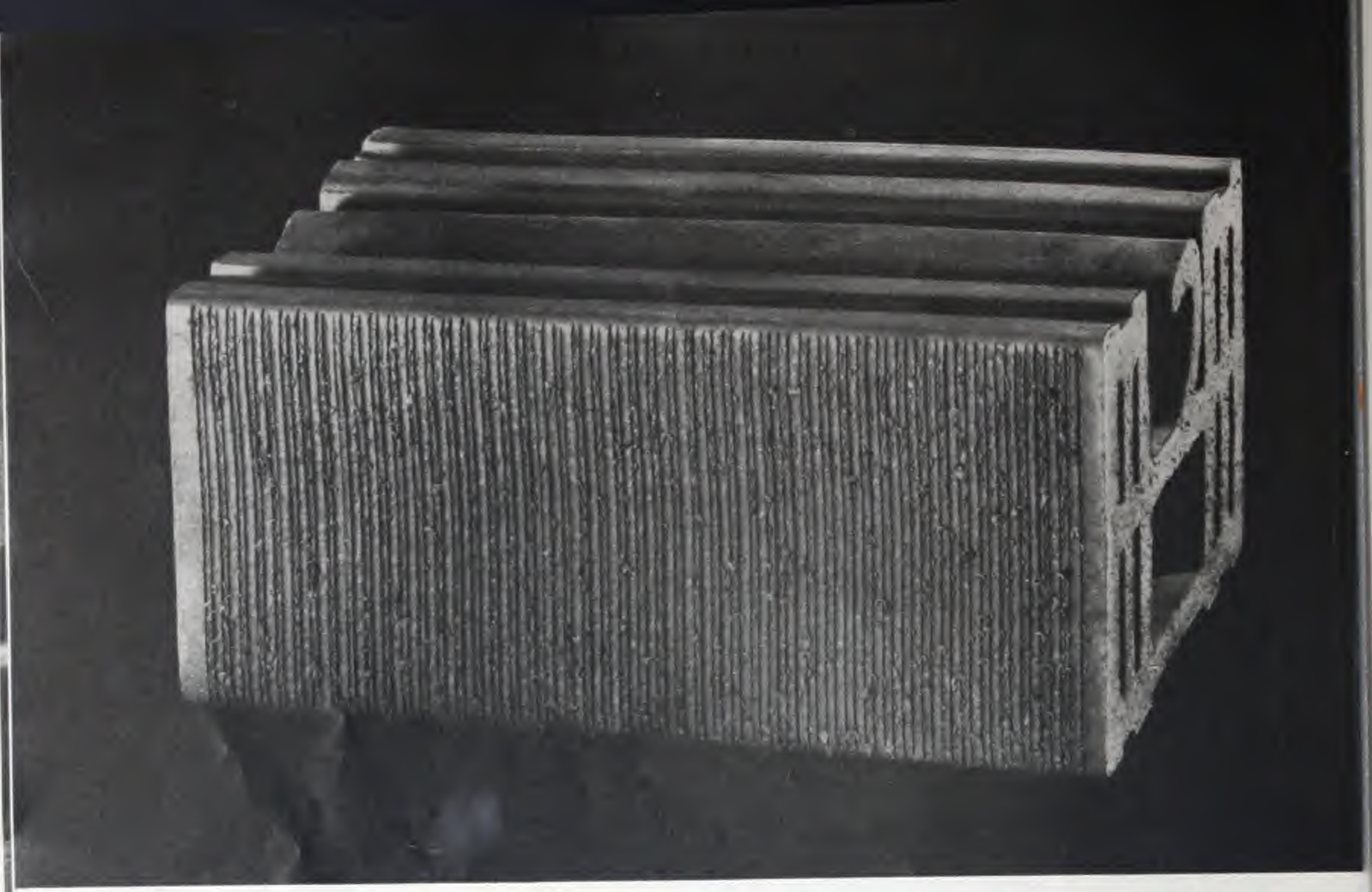

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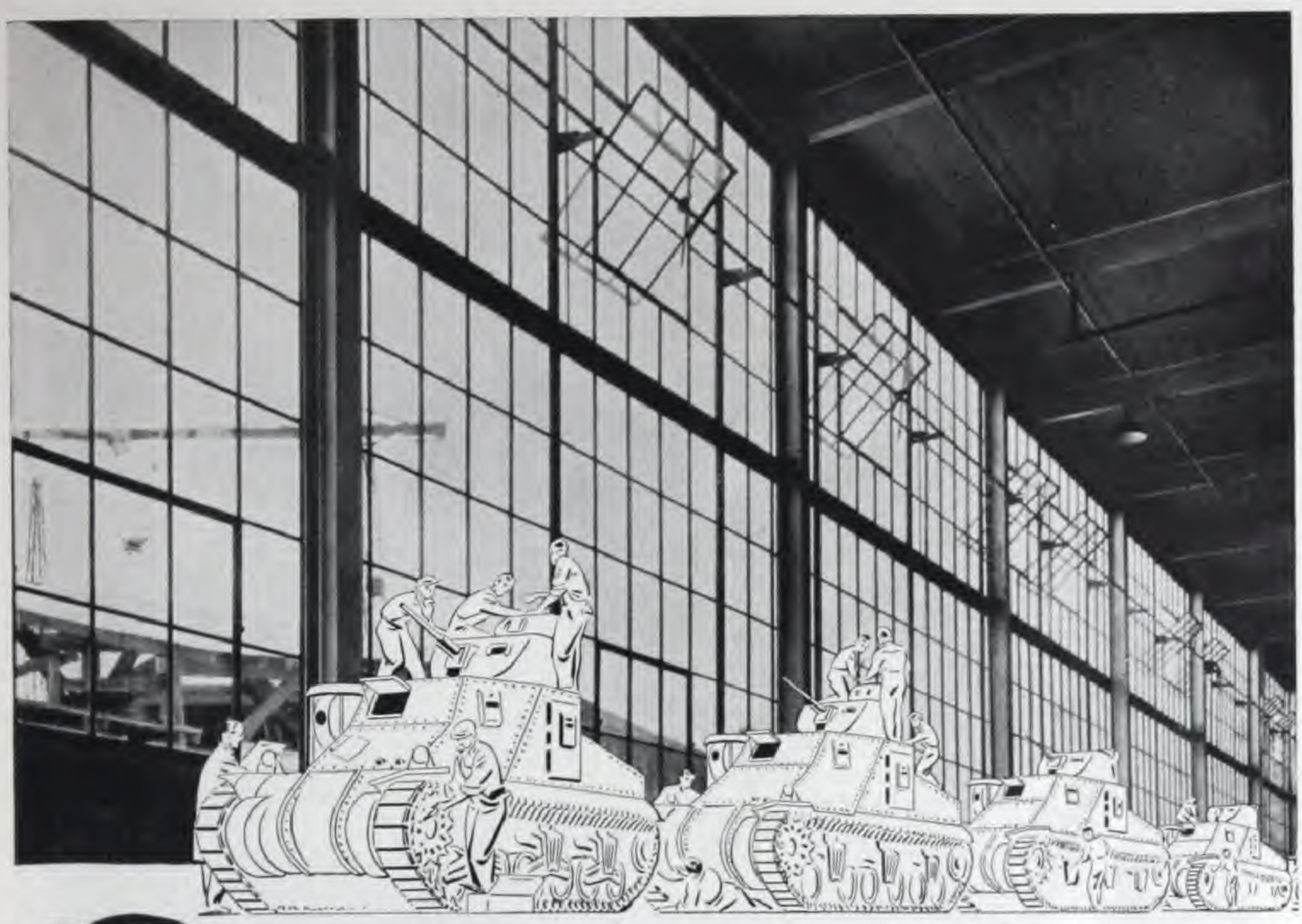

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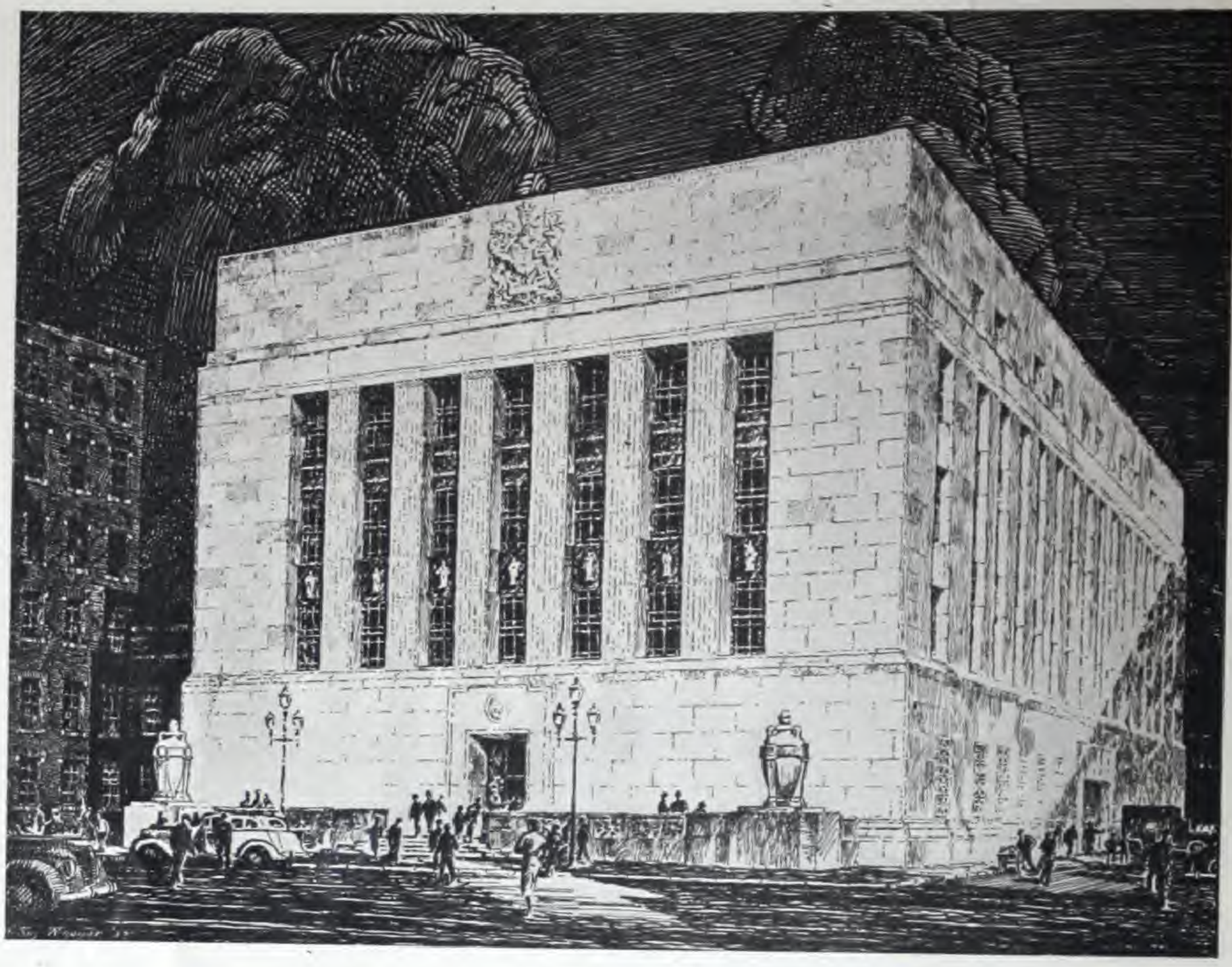

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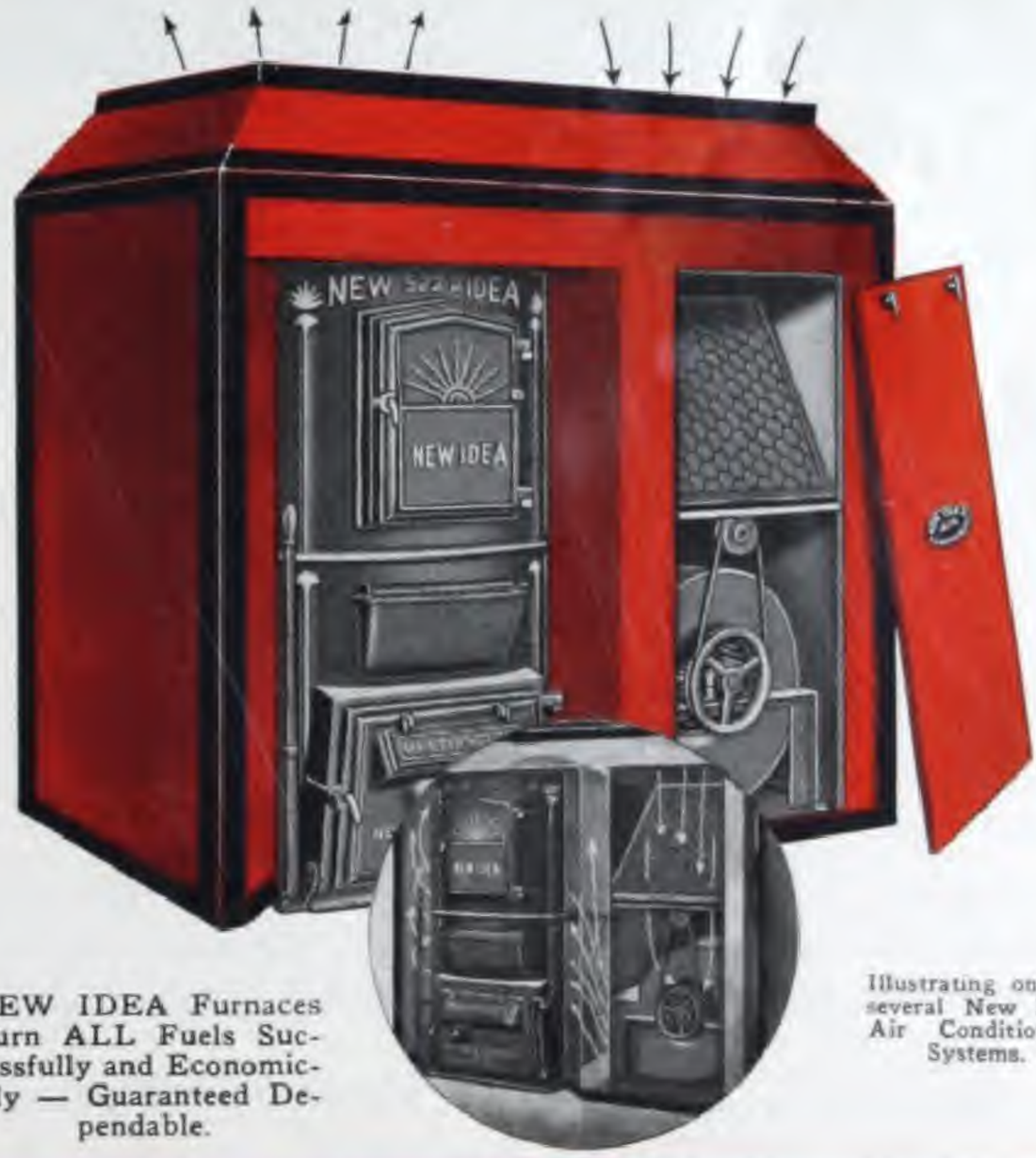

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MacLean Building Catalogue

1942

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★ADVERTISER No. 88

What is the Measure of a Well Designed House ?

By R. W. CHESLEY

WHAT constitutes good architecture? Directed to any group of prospective home owners, builders or even architects, this seemingly innocent question can develop into a cause celebre.

Everyone believes in good architecture. That goes without saying. But to define it is another matter. One has only to look at most urban residential developments to realize how many different conceptions there are.

Architectural competitions and contests in which the public has participated as judges have also added to the confusion since those designs which most closely approximate architectural purity and which rank highest with the profession are often found well down the list in popular acceptance. Speculative builders can also point to many "cute" houses which have outsold better designed homes.

Discouraging as this seems to those who are responsible for the planning and designing of Canadian homes, there is ample evidence to show that public appreciation of good architecture is constantly improving. Other professions and industries have also frequent occasion to question the public taste but it is noticeable that the "best sellers" over a period are those with some fundamental appeal to artistry and that the level is surely rising.

Undoubtedly some purists among architects have found it difficult to accommodate their ideals to modern demands, but they must not be surprised if many of their clients, untrained in the niceties of Colonial, Georgian or other types, are ready to sacrifice some of these niceties in order to secure features unknown to earlier generations. Most building plans are the result of a series of compromises and that is truer today than ever before. The skill and ingenuity with which many architects are adapting modern interior arrangements to traditional exteriors in a happy combination of the best features of both, is proof of what is possible.

Many of the mistakes which now mock us on residential streets are due to the little attention given by architects in the past to the problems of smaller homes. Today the small home is recognized as one of the greatest challenges to the profession and many of its keenest minds are directed to its solution.

There are many who believe that the house of the future must break with the past completely. There is now being evolved, they believe, a new type, which will take its place with those classic designs which have come down to us through the years. But among these more daring spirits there is even less unanimity about what constitutes good architecture than among the traditionalists.

And that is the way it stands. What is good architecture to some of us is an abomination to others. What one builder may think is a "swell little house" may seem like a mistreated box-car to another, and even worse to the architect around the corner. One says a house is "inspired"; another says it is "Gosh awful." Builders disagree violently about looks. Is there any wonder that they are inclined to adopt a practical method of settling the question—the sales chart? What sells best is best, they say.

Builders in general, and the speculative builder in particular, have been unfairly criticized for architectural forms that are not, strictly speaking, their fault. The real fault, if there is one, lies with the age in which we live.

Unfortunately, architecture differs from such arts as painting or sculpture in that it is so closely bound up with and restricted by the everyday lives and living habits of plain people. When builders undertake the erection of a structure they cannot let their own ideas of beauty prevail; they are forced to adapt the structure to the needs and living requirements of the people who will occupy it.

Art versus practical use is an age-old controversy that is still going on in our modern building activity. Many architects and many builders make conscientious and sincere efforts to produce what they feel are beautiful structures, only to find that their idea of beauty is too far advanced or too restrained to catch the public eye. As a result they have found themselves forced to make houses, apartments, and business structures more truly an expression of the desires of their customers.

Builders should be leaders in developing good design, but they must be cautious not to advance too far ahead of public taste if they are to be successful in business.

Another point that is frequently not considered by critics of the building industry is that the style of architecture must be adjusted to suit the tastes of the type of customer served. People who are fond of the gaudy colors and bright displays of this jitterbug age may not be satisfied with houses of restrained, quiet design. Sad as it may seem from an artistic viewpoint, it is a fact that the "jitterbug architecture" of some speculative builders is a true expression of the tastes, the culture, the needs of the class of people who live in them.

Some believe that the solution of our architectural problems will be found by adoption of a newer and more modern concept of the purpose of buildings; that the style of the structure should emerge out of the purpose to which it is to be put and the modern materials from which it is to be built. In other words, the homes, apartments, and business structures of the future will not try to copy designs of the past, but will express the requirements, needs, and materials of the present.

If ever public taste accepts this viewpoint, builders will no longer worry whether a structure is Cotswold, Cape Cod or some other type, but will merely have to answer the question, "Will this building naturally grow out of the requirements of the user and the materials at our disposal?" Such a tendency is already manifest to a considerable extent. Public buildings, especially the store and factory are more and more tending to be independent expressions, rather than copies. Houses are following suit. The way has been paved by modernists whom not long ago many people were calling "radicals." Architect Frank Lloyd Wright, for example, more than a generation ago started designing houses that hugged the earth, let in sunlight, and centered about the comfort of the hearth. He eliminated attics, bay windows, cellars, corner towers, and scroll work, and made his interiors airy and spacious and proportioned to the people who were to inhabit them.

The new philosophy in home development was expressed by another leading architect as follows:

"In planning a house, the looks of the exterior should not be considered until every requirement of the interior that will make for comfort and happiness has been solved. A good interior cannot be fitted into the set mold of a Colonial, an English or a French Provincial house of a hundred years ago . . . After all, a house is built to live in, rather than

(Please turn to page 64)

B.P. asphalt shingles enhance the charm of this interesting Colonial design.

Crash Helmets for Homes

by PETER JEFFERY

QUITE frequently in the past, roofs have been facetiously likened to headgear and comparisons drawn as to their similar qualities and purposes. Personally, we have considered the thought farfetched until we saw a mechanized detachment parading for the war-saving certificate's drive.

"What kind of a headgear is that?" said I to the sailor lad who had thumbed a ride. "That's a crash helmet!" said he.

Well to make a long story short, the helmets fit so snugly, with no brims or catch basins to hold the weather that the thought persisted that it was the perfect roof for the fighting man and could be copied to advantage by a self respecting building that wanted to be well and truly covered.

One of the first things the carpenter's apprentice learns is how to anchor a roof against wind pressure, snow and the thrust of rafters. We do not often experience tornadoes in Canada but the house and the roof—if it is a pitched one—must be insured against parting company so far as it is humanly possible to do so.

The flat roof can be made strong enough to hold great snow loads, and tight enough to prevent rain from seeping through while, for wind resistance and outward thrust, it is and always has been superior to the pitched roof.

If you want a flat roof on your house, it will have to have more support than a pitched roof to hold snow and rain but you will cut out a lot of waste space that increases the cubic cost of your home. A pitched roof provides attic space and that in turn may give you one, two or more extra rooms and justify the extra cost, besides achieving the architectural style you are following.

The slope of a pitched roof determines the bracing. If the slope is slight there will be danger of leaks with the wrong kind of covering and excessive weight may cause it to sag. Pick out the kind of material you want on your roof and that will decide the slope and the strength of the framing. A roof having many ridges, valleys, dormers or chimneys will cost considerable more to cover than one having a plain surface. Generally speaking, the steeper the roof the steeper the cost.

Look ahead when considering the cost. How long will the material last and does it need a periodic overhaul? When a roof is hard to apply, you might as well have durable material for the future cost of repairs will be high. Put on a roof that will last

(Please turn to page 68)

The Enduring Beauty of Brick

Few other materials have so great a hold on the building public

ONE of man's oldest building materials and yet, one of the most popular today, is brick. But the standardized prefabricated building unit which forms our brick walls now is a far cry from the sun baked building blocks of the Babylonian masons.

The ideal wall for dwellings has been described as one that is weatherproof, fireproof, vermin-proof, strong, a good heat insulator, economical to build and with a surface of pleasing texture and colour. Walls constructed of brick come very close to these specifications. When properly laid up in mortar, the resistance of brick walls to rain, sun, abrasion and frost has been proved. By the very nature of their manufacture, under intense heat, bricks make the ideal fireproof wall. As for strength, the weakest brick in a wall is never subjected to more than fifty per cent of its resistance to crushing. Familiar to all is the infinite variety of color and texture created in brick walls in every century, and in almost every country.

Weatherproof Qualities

Hard burned and medium burned bricks are almost indestructible when exposed to the conditions of weathering. On this question the Clay Products Technical Bureau of Great Britain says, "For positions of extreme exposure to frost, only bricks of very close texture (low microporosity) should be employed, since, when there is a large proportion of pores easily filled with water by simple contact, a series of hard frosts following days of continuous rains may produce enough ice in those pores to damage the brick."

United States Federal specifications state that, "Soft bricks are generally suitable to positions not exposed to weather or soil. This should not be taken as a rigid distinction, for variations in the physical properties of bricks from different parts of the country make it difficult to predetermine weathering resistance by any simple acceptance tests . . . . The purchasing officer should be guided in part by the known performances of comparable bricks from the same locality in resisting the effects of weathering.

"In cases of doubt, and where the time and equipment are available, acceptance in point of weathering resistance can be based on ability to withstand 100 alternations of freezing and thawing conducted according to generally accepted laboratory procedure . . ."

However, the weather resistance of a brick wall is not alone a matter of the brick used; the **workmanship**, the **mortar** and the character of bond used play their parts. It has long been a matter of speculation how water penetrates a brick wall. That in some cases it does has been common experience.

The United States Bureau of Standards has been making studies of this problem, and in a recent bulletin reports: "Quality of workmanship has a major influence on the rate of penetration of water."

None of the walls of Class A workmanship leaked, according to this report. When dampness penetrated such walls it was transmitted by capillarity. "With the nearly non-absorbent brick," continues this bulletin, "moisture penetration was more rapid in the mortar than in the brick; with the more absorptive ones, it was more rapid in the bricks. The greatest leakage occurred with walls of bricks of low absorption and Class B workmanship."

Investigations along similar lines have been made by the English Building Research Stations. The nature of its conclusions is more definite. It concludes that moisture penetration through walls almost always occurs at the mortar joints. A capillary path is found between bedding mortar and the brick. Such cracks, according to its report, are more likely to occur in the case of non-porous bricks bedded in cement mortar than relatively porous bricks bedded in lime mortar.

Efflorescence

The appearance of white salts on a brick wall is a most disagreeable phenomenon to cope with. Although this efflorescence, as these salt deposits are called, washes away in time yet there are many examples where it comes out each spring for a number of years. The subject has been investigated by technicians, but the suggested methods of correction are not always possible because there are often a number of contributing causes.

The salts may be in the bricks used or in the mortar, or both. As the water in the wall comes out on the surface, it carries the salts with it and deposits them when it evaporates. They may be washed off by a diluted solution of hydrochloric acid. Then, if no more water gets into the wall, the salts will not appear again. This is hard to prevent. However, a well pointed brick job, which has been laid in a first class manner with all parapets waterproofed at the back and covered with a coping, and the joints in wash courses and the sills and frames of windows properly filled with elastic caulking cement, ought not to show efflorescence.

To further insure against the salts coming out of the mortar it has been suggested that two per cent of barium carbonate be added to fix them chemically. Some of the patented ready-mixed cements used in making mortar for brickwork will also prevent this salt scum because they have in them water repellent material like calcium stearate, which prevents passage of the salty solutions.

Certain clays of which bricks are made contain chemical impurities which, if not burned at a very high temperature, remain in the finished bricks until dissolved by the water used during construction. As this water dries out, the salts are deposited on the surface. Bricks of this nature can sometimes be detected if a sample is allowed to stand in a shallow pan of water for some days. Specifications ought to exclude them from use as face bricks.

Mortars for Brickwork

There are four kinds of mortar for laying bricks: (a) lime and sand, (b) cement and sand, (c) cement, sand, and some lime, and (d) ready-mixed cements, containing lime and waterproofing for use with sand.

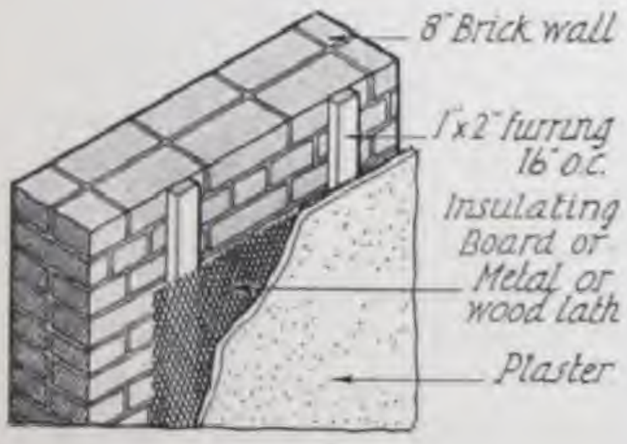
Lime mortar was used almost exclusively before the advent of cement. Straight portland cement mortar is not well liked by the mason because it works short and stiff under the trowel. Cement-lime-mortar is smooth, works well under the trowel and is less expensive. The usual proportions are 1 part cement, 1 part dry hydrated lime and 6 parts sand.

Patented ready-mixed jointing materials usually contain cement, lime, and some waterproofing compound. When mixed with 3 parts of sand, the resulting mortar is very plastic and hardens slowly enough to get a good hold in the pores of the brick.

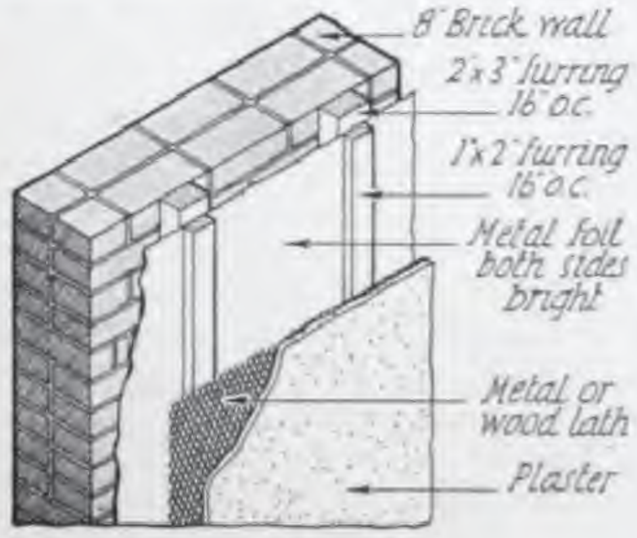
Strength of Brickwork

The compressive strength of the brick masonry depends on the strength of the mortar as well as the brick. A minimum factor of safety of about 3.5 in compression stresses is usually found at the foot of a three storey 8-in. dwelling wall, when built on natural ground. This takes into consideration the usual span for joists, the loads they transmit to the walls, the reduction of bearing area due to openings, the insertion of joists and the eccentric loading usually present. In fact, an 8-in. thick brick bearing wall for dwellings, up to 30 feet in height, is considered ample, and at the gable ends the wall may go five feet higher. There are still some building codes which do not recognize this fact and call

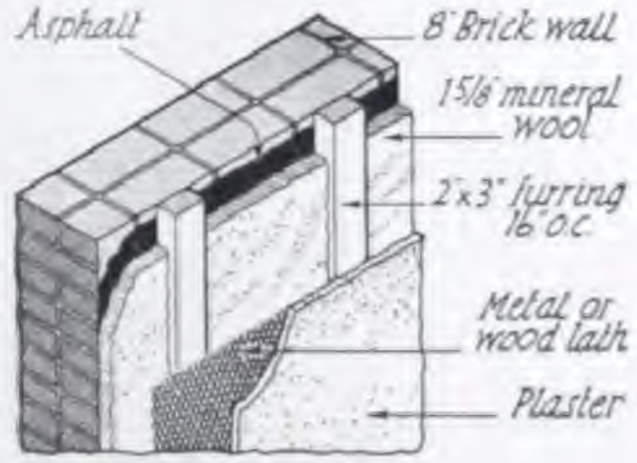
(Please turn to page 36)



Usual Structure



Metal Insulation



Fill Insulation

MacLean Building Catalogue

Castle and Cottage Have Much in Common

by RALPH HEWITT

CASTLE and cottage have much in common. Neither of them can wholly exclude the climate however well they may be built, and the castle perhaps less than the cottage. History of the social kind, reveals the fact that for unadulterated discomfort, the typical castle had every other type of building backed off the map.

The lord of the manor sat in his baronial hall at meals with his feet swathed in furs, likewise his body, while the playful zephyrs waved the heavy arras hanging on the dark walls and blew the heat of the yule logs up the chimney. The castle could be defended against an army but not against the climate. On the other hand, the cottage might have difficulty keeping the wolf from the door, but the occupant could stuff the opening which served as a window, with straw, and secure a measure of smokey comfort.

In course of time, castles came off their high perch and became mansions with close-built brick walls and well fitted windows, while the cottage came up in the social scale and imitated its betters.

Be that as it may, science today tells us that atmosphere cannot be excluded or retained and that there is constant infiltration and exhalation of air in the best of regulated buildings. We may not be scientists but we do know that air waves come in and playfully manifest themselves through our radio even though we have no outside aerial or lead in wire.

So, what's to do?

Well, the modern builder "plugs the leaks" and builds baffles so that the changes of atmosphere in the course of the day are reduced to a minimum and the passage of air is slowed down to such an extent as to be unnoticed except by the electrically controlled thermostat on your wall. But remember, this entrance and exit of air still persists, otherwise, we would be asphyxiated or at least suffer from the effects of lack of fresh air.

First of all you must take care of gaps which occur between different materials and movable parts such as doors and windows. The latter are subject to wear, and warping, expansion and contraction. It is estimated that clearance cracks around the windows and doors of an average home are equal to a hole the size of 22 bricks. These gaps are scientifically taken care of by the installation of metal weather-stripping. The inside edges of all windows and door frames should be weather-stripped. To do this, strips of metal should be carefully applied around the openings of the doors and windows, so that when they are closed, the edges interlock with themselves. Underneath the outside doors, metal sills make a permanent and good looking seal against winter blasts that will otherwise keep all your floors cold besides wasting as much as 10% of your fuel. Opening and closing the door will provide all the fresh cold air you need without letting it rush in twenty-four hours a day.

Another definite gap is usually unseen but nevertheless a trouble-maker. It is the joint between masonry and wood frames. These joints can be sealed by the method known as caulking. Caulking compound swells when dry to fit tightly against the edges of each crack and is forced into place with a "gun". When applied it has the consistency of putty.

So much for cracks which provide unrestricted and easy passage for outside air. Closing them is like saying no to a high pressure salesman. Then commences the battle of wits and the next point of entry is via the window pane. The method of reducing the heat-dissipating activities of glass is based on the theory of the dead air space. There is the old fashioned storm window to be put up in the fall and

(Please turn to page 75)

Banish Fear of a Damp Basement When the House is Built

by JOHN R. HASLIT

"DELIVER me from the curse of damp basements," has been the prayer of countless home-owners who have experienced their discomforts and worse. And it will probably be echoed by countless others who neglect to take proper precautions. A dry basement adds just that much valuable living space to the home. A damp or leaky basement is just that much of a liability. You can use it neither for living, nor, if you have proper regard for your possessions, for storage, and it often is a definite menace to health. Yet the one most common complaint against home construction is a damp basement. Why?

The reasons are essential knowledge if you are building a new home, because the remedies are most easily put into effect when the house is being built. It is equally important to know them if you are installing a new heating plant. In order to take full advantage of the extra space and cleanliness it offers you, you need a dry basement to work with.

One reason, of course, is rain. Unless it is carried away from them, rain collects on the surface of the ground next the foundation walls, whence it will penetrate any porous areas or cracks they offer. Any condition which encourages it to collect there, or prolongs its stay, like a slope toward the foundation walls or heavy shrubs and vines, aggravates the damage. And even basements otherwise sound and dry may succumb during heavy rainstorms which beat in at bulkheads, windows and areaways and increase above normal the amount of surface water.

Water normally present in the ground is another reason. Such water seeks the level dictated by the physical laws which control it. Should that level be above the level of your basement floor, hydrostatic pressure will force the water through foundations and walls unless they are thoroughly waterproofed.

Condensation also causes dampness. When warm, moist air comes into contact with cold pipes or walls, it forms moisture which will accumulate and keep the basement chronically damp. Or the plumbing may be at fault. Even worse than a basement flooded with rain water is one in which the sewer has backed up to spread its obnoxious contents over the floor. Less spectacular but nevertheless effective are leaking pipes, or a leaking refrigerator drain.

You can't keep the rain from falling, but you can protect your basement from it. Locate your house with this in mind. Ideally the ground should fall away from the foundations in all directions to provide natural drainage. It is essential to have such a slope in at least one direction. If a steep up-grade drains toward the house, some provision should be made to divert the water on its way down. And beware the house cozily nestled in a hollow. The odds are against it!

(Please turn to page 68)

Gone are the days when the cellar was merely a hole in the ground, necessary because it housed the heating plant, but visited only when the fire needed fixing or vegetables were needed from the bin. Today's basement is used by the whole family for entertaining, as a games room or indulging hobbies. Dry walls are essential.

Photo courtesy British Columbia Plywoods Ltd.

Sheridan evergreens massed as a boundary to the driveway at McMaster University, Hamilton.

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Permanent Planting for Maximum Results

By H. B. DUNINGTON-GRUBB

NOT everybody on my street is a garden enthusiast. On Saturday afternoons in April I see many neighbours at work on their gardens. Whether they are there or not, however, there can be no mistake about the nature of the hobby of the owner, be it gardening or golf. In the one case I see preparations going forward for flowers. In the other case an original attempt at beautification has confined itself to some permanent planting of evergreens and shrubs, and there the enthusiasm has ended.

Whether gardeners or golfers, however, almost everybody shows some evidence of wanting an attractive looking home. The difference between the two is chiefly a question of maintenance and upkeep. The former, having gardening as a hobby, are out for change and improvement. Each year they want better annuals and perennials, the newest roses, and they are prepared to work hard to get results. The latter are interested in a type of permanent planting that will maintain itself with a minimum amount of upkeep. They wish to avoid the worry of having to face decisions about major operations involving the removal and replacement of overgrown and deteriorating evergreens and shrubs.

As I write I sit facing the house of neighbours across the street. When their Lilacs were planted twenty years ago, either side of the front entrance, they looked nice three feet high. To-day they are blocking the light from second story windows, not to mention the ground floor, and the front door is entered under an arch of foliage. The owners seem to lack courage to face the surgical operation involved in their removal. In this short article I wish to offer advice to golfers and others who want permanence, that is to say, a garden that will "stay put."

When arranging permanent planting round a house it is very important to give most thorough consideration to the ultimate height that trees, shrubs, and evergreens are likely to reach. The planting, against the house, of shrubs that will reach the eaves trough in twenty years is absurd. An ultimate height of three feet is enough for such planting. In a small back garden I saw recently Weeping Willows planted in a rock garden close

No tree should be planted less than thirty feet from a house.

The latter stages of the golfer's home.

Going—going—gone! A house almost obliterated by unsuitable foundation planting and Boston ivy.

to the house. Although they looked nice at that height it was pointed out that in a few years they must reach the dimensions of forest trees, smothering both house and garden. Of all types of planting shade trees require the most care as far as location

(Please turn to page 96)

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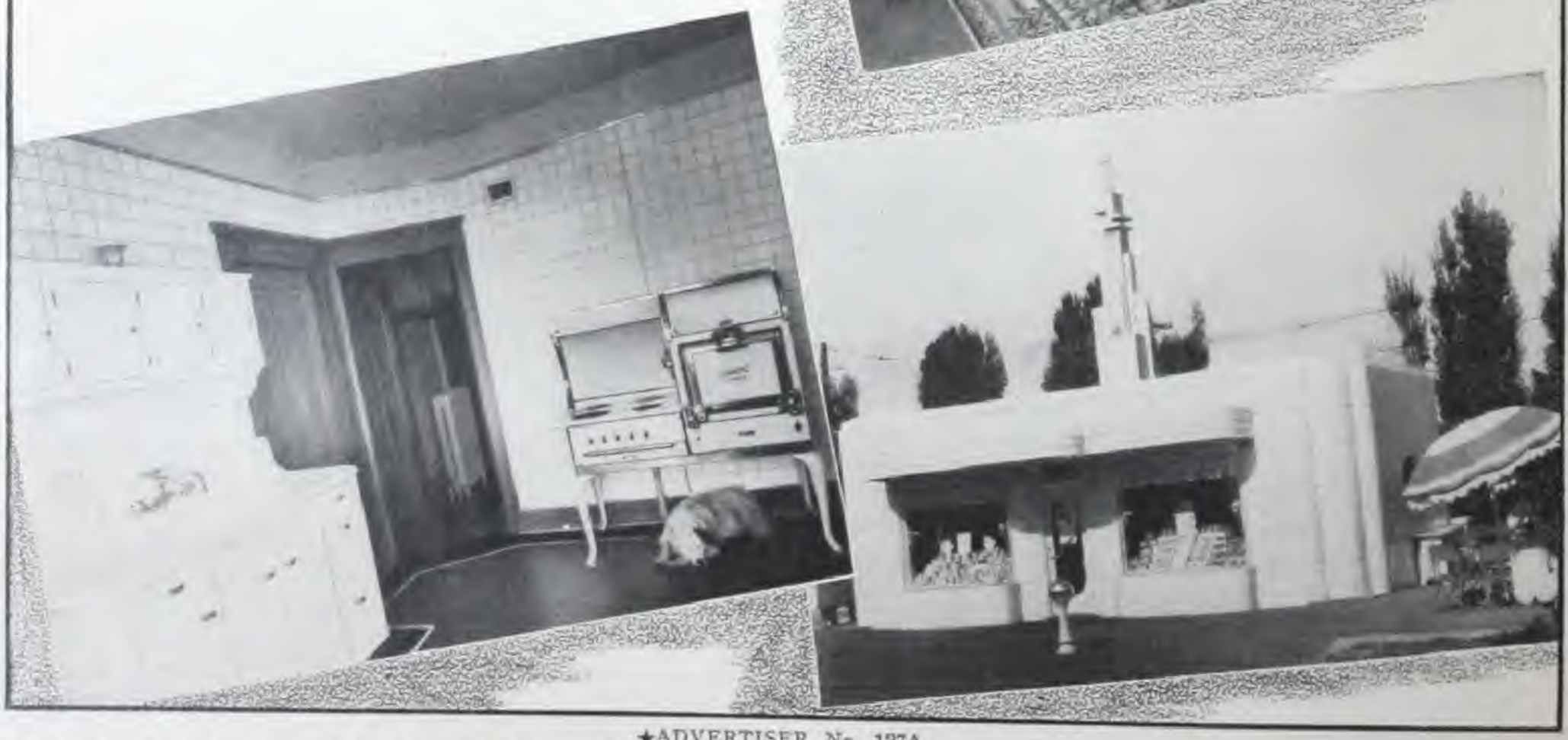


This house needs a thorough remodelling job inside and outside.

Farm Home Remodelling

The War has turned the eyes of many people back to the land and numerous old homes are being remodelled

This is how the house will look when the remodelling job has been done.

THIS farm house, typical of many thousands in the eastern and middle western sections of the country, is about one hundred years old. To the average untrained observer it is likely to appear as a hopeless wreck long past the right time for demolition. Just a brief glance by a trained eye, however, reveals several interesting things. The ridge of the main section is entirely without sag, the corners are just as truly vertical as on the day they were set, and the architectural proportions of the main section leave little to be desired. Closer examination shows that an expenditure of perhaps two thousand dollars can transform it into a comfortable home for a good many years more.

Siding on the main and rear sections is oak and white pine. On the wing being used as a kitchen, siding is black walnut which has deteriorated almost hopelessly on the south exposure. This, with ten or fifteen rotted boards on other walls, will have to be replaced. Thus, with a very small cost in lumber, and with a coat of asphalt paint the exterior can be preserved and beautified for an indefinite period.

The rear wing, at present being used as a work room, is on posts and sills with no excavation beneath. The wing needs a new brick, stone or concrete foundation extending below the frost line. Roof boards on the main section and wings are all well preserved, and new shingles are all that is required overhead.

The basement floor, of dirt, is somewhat more than eight feet below the base of the timber girders carrying the first floor joists. The foundation walls, of limestone, are tight and waterproof. Addition of a cinder bed, a concrete floor and a tile floor drain will make the basement dry and serviceable.

At present the house contains no plumbing. There is provision for three stoves to supply heat on the first floor. The three flues are all bracketed about three feet above the floor level. Removal of these, and addition of a full length flue from the basement will permit installation of a warm air furnace, and provide central heating.

A high attic makes it advisable to apply insulation between the second floor ceiling joists, leaving the attic cold and holding the heat below. The exterior walls are heavily back-plastered with cement. Interior plaster is true, and almost entirely free from cracks.

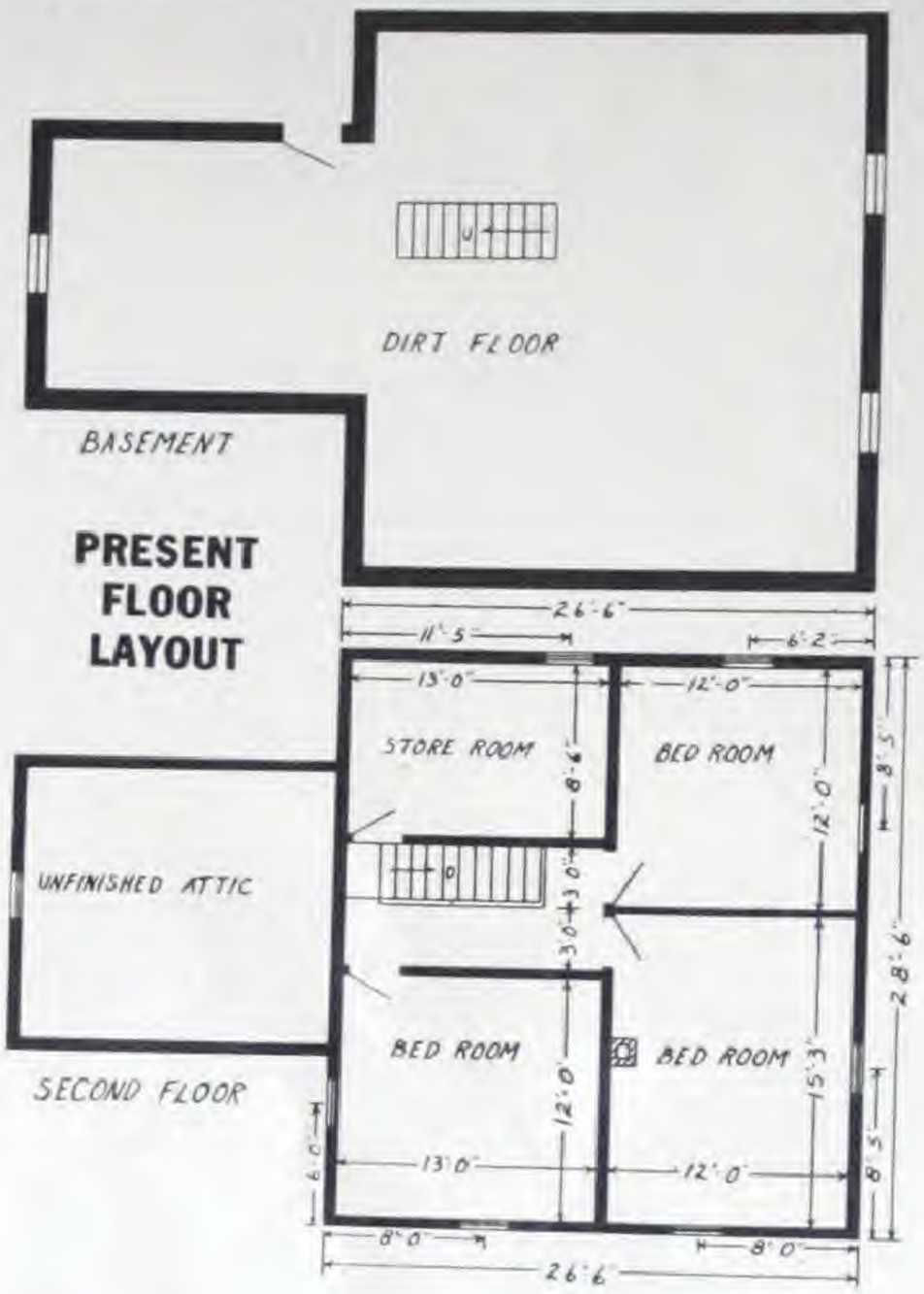
The proposed new layout shown in an accompanying drawing is predicated on giving the house utility and liveability as a farm home with a minimum of expense. Accordingly, it calls for no change of roof lines, and no moving of pre-

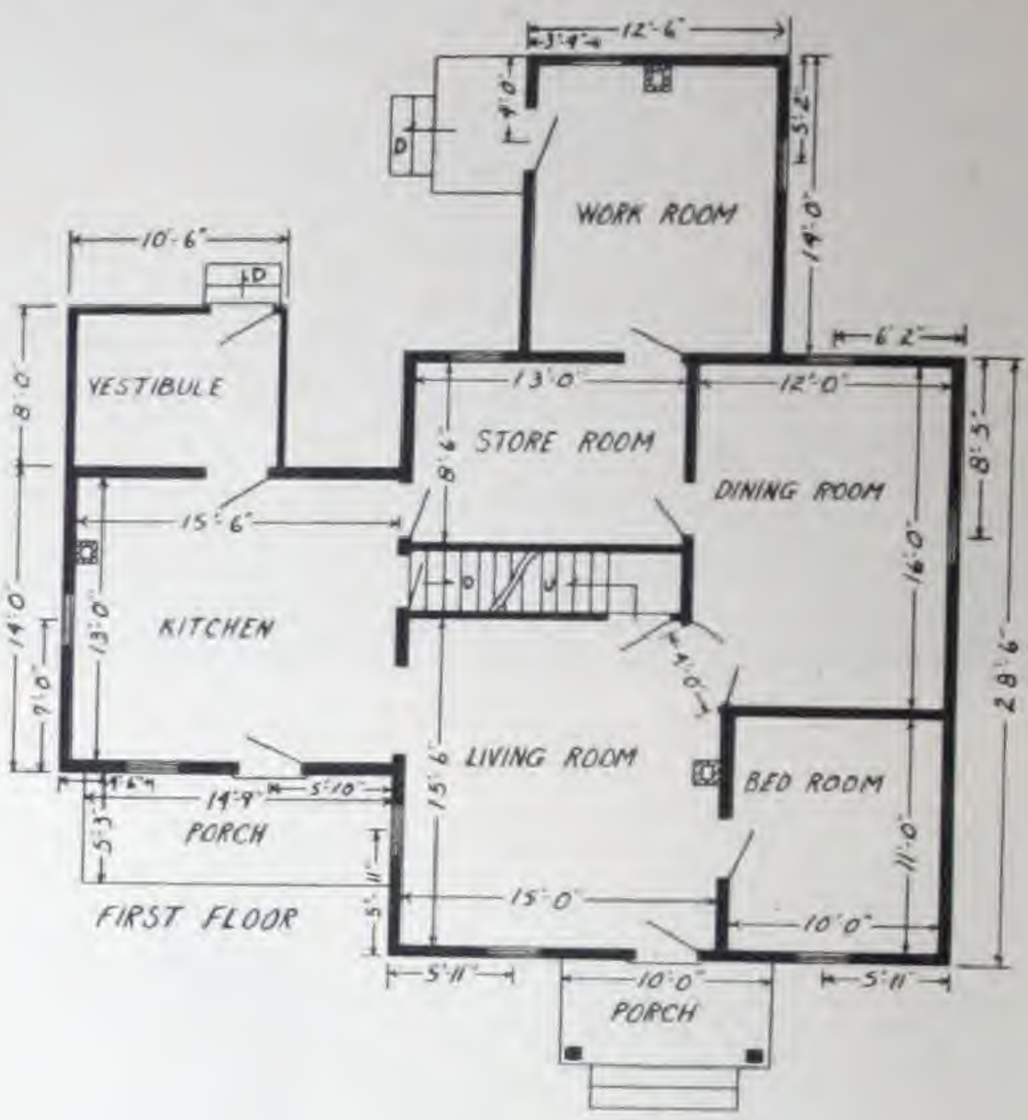
(Please turn to pages 32 and 34)

Farm Home Remodelling

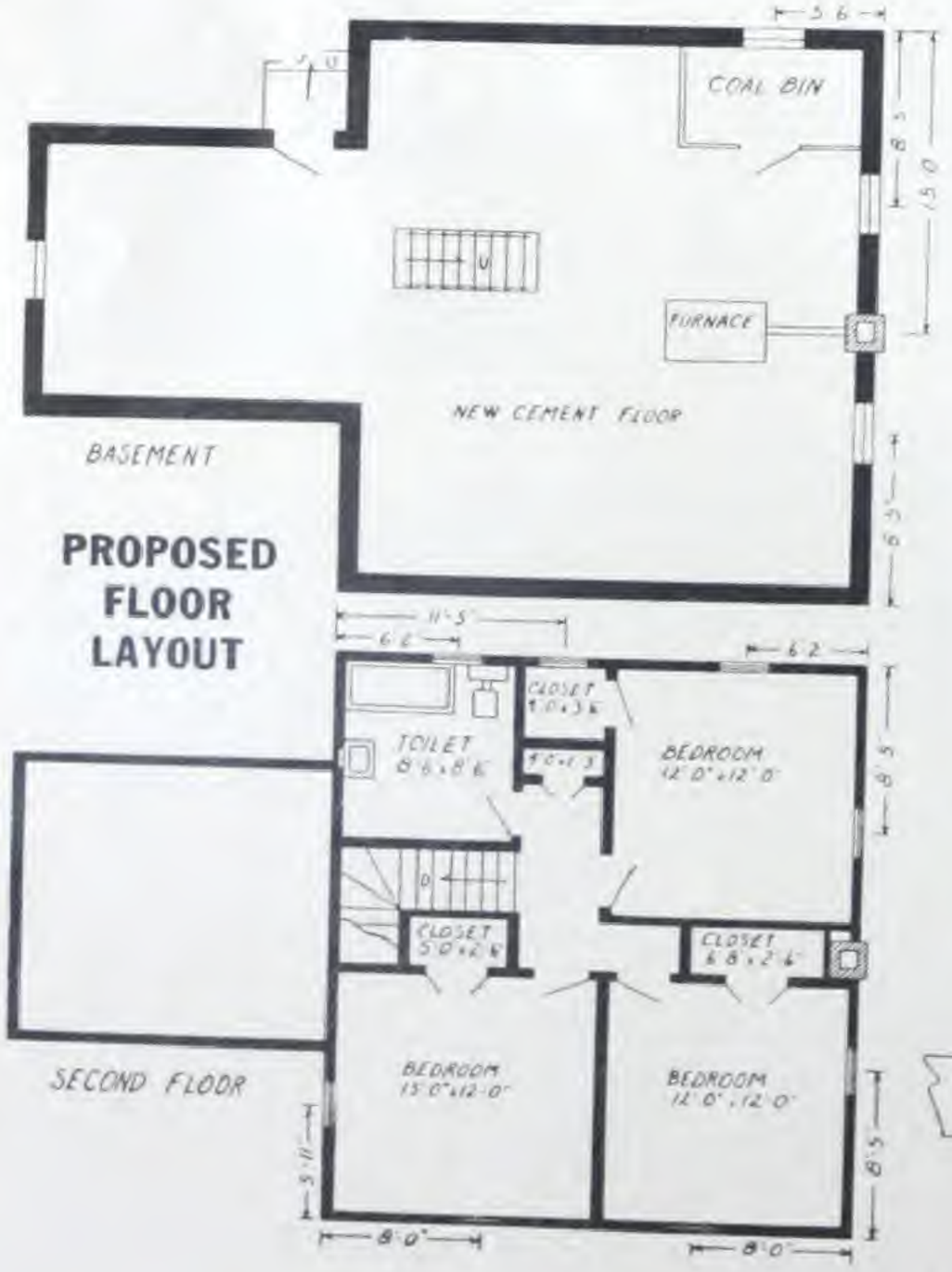
(Plans for remodelled house on page 31)

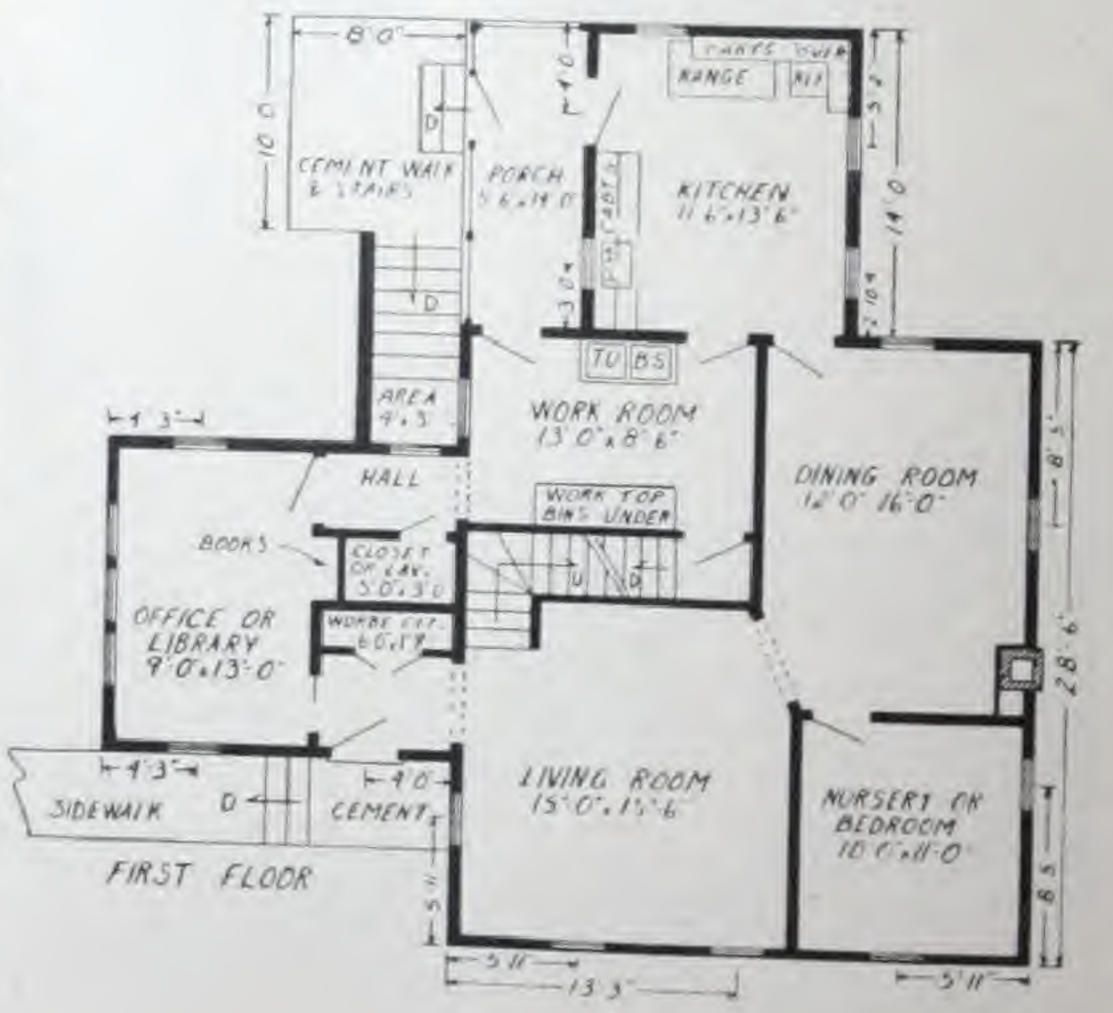
The two top drawings show the plans of the old house shown at the upper left of the previous page. The basement, first and second floors are given detailed attention.





The two lower drawings show the plans of the proposed remodelling job in the new house shown on the previous page. Note the changes that have been made on both floors and basement.





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★*For Free Inquiry Service please turn to page 5*

Farm Home Remodelling

(Continued from pages 31 and 32)

sent interior partitions on either the first or second levels.

It was desired to make the kitchen directly accessible from the dining room, to provide a work room and an office, and to decrease the stairway leading to the second level. To cut costs it was desirable to use the existing stair well. This was accomplished as shown. Even if the direction of the stairs had not been changed, it would have been necessary to move them, since there is an awkward landing at the top only about 18 inches wide, and a step up to the hallway on one side to the second floor store room on the other.

With this accomplished the present first floor store room was too small for an adequate farm kitchen with space for serving meals. Further, such a location for the kitchen would have made it a runway from the rear entrance to other parts of the house. Locating the kitchen in the present rear wing gives it direct access to the work room and the dining room, provides adequate space, and eliminates cause for it to become a runway.

A long porch provides two rear entrances, and makes the work room serve as a central rear hallway, although it does not give access to all the rooms on the first floor. If it is considered undesirable to go through the dining room or the office to reach the stairway to the second level from the kitchen a door can be provided on the living room side of the landing leading to the basement stairs. The front sidewalk from the new cement stoop leads south to the driveway. On the rear wing two windows are added, and one door is placed in the partition between the kitchen and dining room. One new window is provided in the work room, four in the side wing, and one in the front of the main section. A slide door has been provided between the front vestibule and the office.

On the second floor adequate closet space has been provided for the three bedrooms, and a linen closet has been added. Hall space on this level is dark unless bedroom doors are left open. However, since the hall space is small, and since doors to the bath room and all the bedrooms are close to the head of the stairway, this is perhaps not a serious inconvenience.

The outside doorway from the basement is already in place, and likely at one time was reached from an outside wooden stairway leading down to it. If such a space did exist it has been filled. Aside from the chimney stack and the floor, the only change required in the basement is the addition of a coal chute to the new bin.

Have You Considered a Fence?

THERE is an old saying that an Englishman's home is his castle, which is merely another way of saying that, be it either castle or cottage, it is absolutely private and intrusion upon that privacy is one thing an Englishman will not tolerate. One of the earmarks of that privacy is the fence.

And the fence—the wood fence—is coming back into its own. Not, perhaps, as a stern sentinel to guard the privacy of the home but as a distinct decoration that is useful as well as ornamental. Like many other commodities, attractive wood fences can be built within a wide price range. Cost is dependent more upon the amount of special materials than upon the style or size of the fence. Picket style fences require posts, stringers, and pickets. All three of these items are available in most retail building material establishments as stock or ready made items.

Fence architecture is somewhat like house architecture—it may be formal, informal, rustic, elaborate, costly or very inexpensive. Even as the type of garden is usually designed for appropriate harmony with the style and size of home which it surrounds, so, too, the fence should match in feeling both architecture and garden arrangement.

Of course, the most common, and probably the most popular, of all fence styles is the simple picket type, which found its first and most extensive roots in the colonial architecture of New England. And just as New England homes are an outgrowth of English predecessors, so New England gardens and fences borrowed their style from the quaint cottages of English village and countryside.

In quite another category from that of the quaint but universal picket enclosure is the higher, more elaborate school of design ordinarily associated with formal gardens. For a town or suburban plot, or for the symmetrically laid-out garden which seeks complete exclusion from the outside world, a tall fence is necessary—and pickets do not look well over five feet in length.

Many houses require masonry retaining walls to keep down the erosion of terraces but that does not eliminate the opportunity to use a wood fence; in fact, a fence of bantam pickets improves the appearance of the retaining wall.

The predominant pattern of a picket fence is vertical lines. Vertical lines over too great an expanse are sometimes tiresome and confusing to the eye. In a straight run, therefore, of 100 feet or more it is well to consider a style other than pickets — a stretcher fence, for instance. Since there is much less material in a stretcher fence, its cost per lineal foot is considerably less than the picket style. And as this type is used over long areas, this saving tends to make up for some of the extra posts and labor needed for a large plot.

The gate is one of the most decorative parts of the wood fence. Great care should be taken in the selection of harmonious style.

Lower left—An interesting but intricate diamond lattice fence, beautiful and graceful.

Lower right—Pickets spaced 1" apart and installed so that their tops create a modified scallop pattern.

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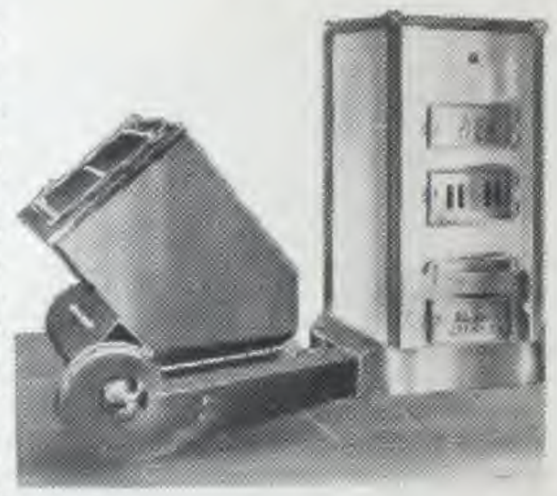

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★ADVERTISER No. 35

Courtesy-Standard Santary and Dominion Radiator Ltd.

A heating system should be planned to fit the house

Tailored to Measure

THE heating system for your home involves your choosing first the kind of system, and then the equipment. The choice of the first is most important and will determine in part your selection of the equipment.

Let us first of all consider the "system." By system we mean the method by which heat reaches the rooms of your building. Let us assume that you do not have to tolerate a fuel burner in your rooms —though stoves must still be used under some conditions—but that a basement or furnace room will house your fuel burning equipment. This necessitates the carrying of heat from the furnace to where you want it, whether it be in the form of warm air, hot water or steam. So then, you must choose whether you want a warm air system, a hot water system or a steam system, although the last two have much in common so far as installation is concerned. The kind of fuel you burn, or how you burn it, has nothing to do with the question at this stage. Fuel burning equipment and mechanical controls are refinements having to do with economical and even firing, saving of labor, cleanliness and general efficiency.

Your choice of the "system" is as important as any other detail in your building project because a mistake will cost a lot to correct. When we bought our first brand new home, costs were very high. We asked the builder if it would cost much to install a hot water system later on when we could afford it. He said, "No, it is cheaper to sell and buy a new one, with it installed." And that is what we did after eight years. We bought a more expensive home but containing the "system" we had always wanted. By all means, plan the "system" you want and one that will meet the heating requirements of the house under all conditions.

A warm air system has much to commend it if the house is small and compact, has a cellar with the rooms on two floors, and proper provision made for warm air pipes, or ducts, as they are known to the trade. The warm air rises naturally from the fur-

nace and the whole house can be quickly heated or cooled by Mr. and Mrs. Fireman. Generally speaking a warm air system under suitable conditions is the cheapest form of installation and is the cheapest to operate because the warm air is but once removed from the source of heat. A bungalow or irregularly shaped house requires a blower to force the warm air along extensive pipes and to overcome cold corners and rooms that are exposed to the wind. If it is a two storey house, the placing of ducts must be planned before work begins. A man we know decided on a warm air system but when his house was built it was found that the placing of ducts necessitated cutting the wall bearing joists. So he had to switch systems at more than double the cost. He got a satisfactory and much better system it is true, but the point is, his original plans did not provide for his first choice and a warm air furnace could have given him satisfactory results.

A warm air system can be expanded to include winter air conditioning. The direct-fired air-conditioning system is composed of a warm air furnace, a humidifier, a blower, vents, ducts, grilles, registers and a number of automatic controls. It delivers warmed, humidified, cleansed air to every room in the house through ducts leading from the furnace to the rooms. The air can be re-circulated, being led back to the furnace through return ducts, reheated, refiltered, and re-humidified before it goes the rounds again. The air in the kitchen and the bathrooms should never be re-circulated, but should go outdoors through vents put into the rooms for that purpose.

Such a system must be planned in advance of construction if it is to be installed economically and work efficiently. Your furnace may be "ready made" but your complete "system" never.

Another factor to be considered, is that modern home necessity—domestic hot water for kitchen and bathroom use the year round. The warm air furnace will not do this in the summer, so you must include the cost of a separate jacket heater, gas or electrically operated storage tank for domestic hot water. You must also consider the probable shorter life of a direct-fired system. The old warm air furnace did not last as long as a steam or hot water boiler due to the comparative shorter life of the fire box which in most cases was of sectional cast iron, cemented together. Neither then nor now do hot air furnaces have the beneficial effects of "water jackets." Consequently, the metal parts are subjected to much greater stress and strain. The sheet metal ducts and casings are subjected to much more wear because of the addition of humidity and the danger that dampness may rust out the ducts. It is easy to see why the rapid heating and cooling which goes on, imposes a tough strain on any metal.

So far we have discussed the things that can be done by means of a warm air furnace and things to keep in mind when considering such a heating plant in connection with your new home. Properly planned and installed a warm air system will be satisfactory and healthful, provide comfortable heat and be economical to install and operate.

(Please turn to page 40)

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CANADIAN UNDERFEED COAL BURNER LTD.

405 Sparks St. - - OTTAWA

★ADVERTISER No. 32A

★*For Free Inquiry Service please turn to page 5*

The installation of a boiler and provision for the carrying of heated water to radiators or convectors by means of fool-proof piping, definitely puts the initial cost of such a system in a different category altogether. It is not fair to either system to compare them with each other on the basis of cost either of material or installation. Neither is it fair to get one price from a furnace man and another from a steam fitter and without expert advice or discussing your needs with both, decide in favour of the cheapest and ever after blame both for disappointment, regret and actual discomfort. They are both reputable men, quoting on first class installations which, to put it simply are not comparable. The only term common to both is "heat."

Take just one condition which may exist. With a hot water system you can dispense with a cellar. You may not need a laundry, or a playroom, or a fruit cellar underground so why build a cellar. You certainly don't need it just to house a boiler. You can save the cost of excavation, foundation walls, doors, windows, stairs, floors and waterproofing. For heating you have a boiler housed in a small room, proper radiation and to make sure of adequate heating, a circulatory pump built into your boiler. This last gadget may cost $35 extra but think of what you save in the cost of your cellar even though your heating system may cost twice as much again as a warm air furnace and ducts.

In other words, accomplishing one result necessitates greater expense to achieve greater saving.

The foregoing illustration may be extreme but all expenditure with regard to heating is relative, just as it is with other things in life. What do you want most? A super-abundance of heat everywhere, regardless of 30° below temperature? Then you must have enough radiation to heat the rooms to 75° and a large enough boiler to heat the water to heat the radiators or convectors and keep them hot. No amount of skimping, however well planned will accomplish that. For generous heat you must plan generous equipment.

But you say, what about my insulation? Won't that cut down on the size of the boiler and amount of radiation I need? To a certain degree, yes, but care must be exercised. Insulation primarily cuts down the amount of fuel you burn. It retards the entrance of cold through walls and roofs. It retards the exit of heat through those same walls and roofs. It keeps your house cosy and relieves the pressure on the fire. But most houses are comfortable in fall and spring. You said you wanted a superabundance of heat in the coldest weather. So don't skimp on your heating equipment. Insulation will save you fuel and pay for itself over the years but go slowly before you make drastic cuts in your initial investment in equipment. It costs money to correct mistakes.

Hot water heat is a life-time installation and permits the placing of the boiler and the heat units wherever is most suitable. The small diameter piping can be carried through partition walls and between joists and is completely out of sight until it makes connection with the heat units.

MacLean Building Catalogue

So far have we come, and we can go no farther, because every building is different, and as we started out to tell you, your heating system must be tailored to measure. We cannot hope to make suggestions on all the assumptions that might be made. If you have an architect, his experience will guide you in selecting the system best adapted to the type of home you are planning and if there is an unusual problem, he, in turn, will consult with a heating engineer. Should you be looking after the work yourself through sub-contractors, discuss the heating with a heating contractor—but do it early —and he can secure, if necessary, a planned layout from the engineering department of any of the manufacturers of heating equipment and without any additional cost to you.

Better still, write any of the manufacturers advertising in the pages of this Catalogue, and you will be amazed at the information and assistance that will be placed at your disposal. They want to help you avoid mistakes which might turn out to be expensive or impossible to correct . . . to help you prevent future heating problems such as excessive cost of operation, inadequate heat, frequent repairs or any of the host of heating worries caused by a heating system which is not suited to your house.

A heating plant is sometimes roughly figured at 10% of the total cost of the house. This does not include the cost of auxilliary fuel burners such as blowers, stokers or oil burners, although you can now buy oil-burning boilers combined in one unit and other types of combination furnaces and boilers. The use of these depend in turn on the most commonly used type of fuel in your neighborhood, whether gas, oil, hard or soft coal. The regular standard type of boiler can be adapted to most types of fuel.

The cost of a combination warm air system with air-conditioning is approximately the same as a hot water system while a straight warm air furnace with ducts will cost about 5% of the total cost of the house.

But as we said before, the cost of your system plus equipment is relative. It can only be determined by planning and the planning is based on what you want and how you wish to accomplish the heating of your home from winter to winter through the years.

★*For Free Inquiry Service please turn to page 5*

Courtesy Crane Limited

Handsome Is as Handsome Does!

There can be small satisfaction in any beautiful bathroom unless it is backed by reliable plumbing

MOST of us have heard of the fable of the peacock which, until it lifted its raucous voice in pride, was acclaimed the most beautiful creature in the world. Similarly many a gay and gleaming bathroom has been admired for its immaculate fixtures until a turn of the tap produced rusty water.

There is more to the plumbing than just the fixtures. In the walls, under the floors, and in the ceiling of your house will be several hundred feet of supply and waste piping for your plumbing system and in addition there will be important valves and fittings.

While the plumbing fixtures are more glamorous than the piping, they cannot give satisfactory service unless the supply and waste piping is well designed, adequate, and correctly installed.

The time to plan for the concealed part of your plumbing system is when you are planning the house. You will save money and have a more efficient plumbing system if you will talk things over with a good plumbing contractor before the plans for your house proceed to the blueprint stage.

Just to show how wise it is to plan your plumbing in advance, here are some of the essential points which should be taken into consideration:

1. Water requirements. These are determined by the number of plumbing fixtures, lawn faucets, garage faucets, and other places where water may be used.

2. This decided, the plumbing contractor will be in a position to advise you on the size of the service line which brings the water from the street to your meter and the diameter of the branch supply lines which lead from the meter to the bathroom, kitchen, utility room, etc.

3. Location of pipe lines. With the modern trend toward use of the basement for recreation purposes, it is desirable to give some thought in advance to the location of piping in the basement.

4. Pressure. If the prevailing water pressure in your locality is high, it will be necessary to use a pressure reducing valve.

5. Equalization of pressure. There should not be too many fixtures on one branch line because this cuts down the volume and pressure. Lawn faucets should not be on the same line with plumbing fixtures. They should be on a separate line direct from the meter.

6. Piping should run as straight as possible. Every bend introduces some frictional resistance. Waste lines should never make sharp bends.

7. Shut-off valves. All branch lines running

(Please turn to page 44)

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"DIRECT FROM THE MANUFACTURER"

★ADVERTISER No. 163

★*For Free Inquiry Service please turn to page 5*

A Downstairs Washroom Is a "Must" for Every Home

"A DOWNSTAIRS washroom will add ten years to your life" was the enthusiastic statement of a woman who experienced its convenience after years in an old-fashioned home. And all who know the steps saved will forgive the exaggeration.

A powder room or wash-room as they are usually called because just a lavatory and a closet are required, need only be as big as a minute to mean all the difference between smoothness and friction in household management. Morning dressing may be done leisurely—not a harried rush for office and school; routine care of the youngsters may be effortless—not a succession of tiring trips upstairs to supervise health habits; entertaining may be graciously enjoyed—not in embarrassment for inadequate facilities. Your own convenience is worth something, too—no dashing upstairs to give yourself a reassuring dab of make-up before dinner or a final checkup each time you leave the house. The study or sunroom may be furnished to play the additional role of guest room, when a powder room is accessible.

Ideally, a powder room is located near the entrance; but so long as it opens from a hall, almost any location is practical. Sometimes it will take the trained eye of an architect or that of your contractor to see where to put the powder room. The deft removal, or addition perhaps, of a partition, or a slight change here or there may provide the necessary space. So have the help of a competent adviser in the early planning stage. Such utilitarian details as the arrangement of the piping system, the location of the stack and position of the radiator are the hidden half of the installation that are not likely to receive rapt attention when one is thinking in terms of enchanting color schemes. Wisely leave these considerations in experienced hands. Your architect and contractor have the newest designing and engineering ideas at their command to solve the intricacies of layout and to insure most efficient performance. Remember, too, that extra help may be had without obligation from the planning service which the plumbing contractor can make available for your use.

Your dealer will show you the fixtures that will best fit into your space and decorative plan. You may need a compact corner lavatory and a closet, inexpensive but smart in design, in the diminutive powder room that you want to install for the least possible amount. Or a cabinet lavatory and a hygienically curved-seat closet in some alluring color may be the right answer for a more luxurious setting. You will want to know that besides white fixtures, unerringly in good taste and around which some of the most satisfying color schemes are evolved, you may have such lovely colors as orchid, ivory, yellow, blue, pale jade, or such stimulating ones as sun tan, Persian red, and black. Give yourself a chance to make a wise choice in fixtures by seeing what is available.

Above all, have your powder room decoration consistent with the general feeling of your house. Since a powder room is used only a few minutes at a time, somewhat heightened and accented effects are desirable, but extremes are avoided in the most delightfully designed ones. Bathrooms now generally reflect a strong architectural influence in their backgrounds because the trim lines and smooth surfaces of modern fixtures are akin to such permanent materials as structural glass, mirror, tile and linoleum. But because of the absence of moisture from bath and shower, more leeway in the choice of wall coverings and fabrics is possible in the powder room. Washable paper and coated fabrics for the walls, in addition to paint, are admirably suited to a powder room and suggest endless possibilities.

Paint the woodwork the same color as the walls and be lavish with mirrors if you wish to increase the apparent size of a small interior. Lower a high ceiling by painting it darker than the walls, or use a dado to shorten the wall height. The chief charm

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Handsome Is as Handsome Does

(Continued from page 42)

to groups of fixtures should be equipped with separate shut-off valves for the hot and cold water.

8. And speaking of repairs—repairs to the concealed part of your plumbing system can be made only at considerable expense and inconvenience. When you are planning your house is the time to plan a system that will be as free from repairs as your plumber can make it. Your best assurance of quality is the use of nationally-known plumbing materials.

9. Beware of orphans. Your plumbing system should be made up of standard, interchangeable parts such as those made by manufacturers whose names are nationally-known.

10. Safety. Quality and dependability in materials and workmanship is your best assurance against a breakdown of the piping with its attendant possibility of damage to furnishings. Good workmanship always pays.

There thus are many reasons why you should take the time to discuss the plumbing for your new house with an experienced plumbing contractor.

He will be glad to go over the entire plumbing system with you—with no obligation on your part. Every good plumbing contractor wants you to have a plumbing system that will give you quiet, efficient, trouble-free performance for many years.

★*For Free Inquiry Service please turn to page 5*

The Kitchen Goes Hollywood

ABOVE—Here is a complete electric kitchen which embodies a popular new idea, namely a laundry unit adjoining. At the rear, behind the two ladies, are built in tubs and a washer and ironer.

•

RIGHT—A good, sound arrangement. This kitchen has walls of beinge tile and the linoleum floor has a border of color to match the working surfaces.

LEFT—Here is a plan recommended by experts of the Modern Kitchen Bureau, New York. This arrangement is featured as costing no more than a room full of new furniture. Notice the flowing lines, well placed cabinets and electrical appliances. It is planned to give the most storage space per cubic foot of kitchen. The placing of the breakfast set is in keeping with modern design, although some prefer a separate nook or corner.

•

By E. W. VanHoek

MacLean Building Catalogue

MODERN planning in the home, particularly in the kitchen, gives the woman of only moderate income a comfort at her work which was undreamed of in the stately castles of Queen Victoria, King Edward VII and even of late King George V some ten years ago. The kitchen has truly gone Hollywood and is frequently the most glamorous room in the house.

Every one of the thirty or so electric appliances for the modern home of moderate income is a work-saver, a step-saver, a health-preserver, as is attested by satisfied users. These appliances have sturdy build, beauty of outline, and they are serviceable.

No less impressive has been the advance in factory-made cupboards which make them marvels of time and labor-saving ingenuity.

One practical feature is the compact efficiency of a modern planned kitchen. It is designed for convenience. Tradesmen bring their goods and often dirty boots to built-in tables near the door. The housewife checks them in and places them in handily placed cupboards and refrigerator.

The cooking equipment is placed in cupboards handy to the kitchen table and the sink is usually right next door, perhaps with (and this will please the children) an electric dish-washer as close neighbor.

The table which is designed to serve the electric range is built in right beside it, so that cooking pans and pots may be placed on it with a minimum of the danger which always accompanies such necessary household work.

Trend Is to Larger Kitchens

The trend today, it seems, is definitely toward larger kitchens. This doesn't mean, of course, that furnishings are scattered at random, with large spaces between each object as of old. On the contrary, the arrangement is more compact than ever before. What it does mean is that the kitchen, for generations the much-loved centre of household activity, is now admitted as such and homemakers want all equipment for routine work concentrated in this room.

Every kitchen must have food preparation centres. Here stove, sink, and refrigerator are preferably grouped together with factory-made cabinets and plenty of surface work space. There may also be a dining section, as every family at some time or other sits down in the kitchen for at least a snack. More and more frequently a laundry is incorporated in the kitchen plan, for women are realizing the step-saving advantages of this arrangement.

Beyond these basic needs, the additional kitchen requirements depend on the specific household. There may be a play pen for the baby, a sewing corner, or an office nook; there may be provision for relaxation. These are just an indication of the variety of endeavor that must be considered when planning the modern kitchen.

But, basically, the convenience and suitability of a kitchen depend upon the degree of thought put into the cupboard arrangements and their relation to the various major appliances and room outlets. These will all be taken into consideration by archi-

★*For Free Inquiry Service please turn to page 5*

tect, builder and owner and there are kitchen planning bureaux prepared to extend practical assistance in the way of plans etc.

In planning for maximum efficiency, kitchen activities are frequently divided into three classifications with cupboards and appliances grouped according to their needs. These might be termed the dish washing, refrigeration and range and food preparation centres. Let us look at these.

The Dish Washing Centre

Various types of sinks are available if there is no electric dish-washer installed. Care should be taken to select the proper kind of a sink for the job involved. Porcelain enamel sinks come in various sizes and in the past few years an increased number of linoleum tops are being used into which porcelain enamel flat rim sinks are installed. These linoleum tops are built up in the factory with a coved back splash, applying battleship or marboleum grade "A" linoleum. The edges of these tops are securely bound with metal, or new colorful plastic mouldings. The sink bowl is securely fastened into the top, particularly so when done in a factory so as to make it water tight. The tops are most attractive because various colors can be had and they tie in with other color schemes in the kitchen. Sink bowls can be had in two compartments, which enable the homemaker to wash dishes in one compartment and scald and dry them out of the other compartment.

The refrigerator, regardless of its make or size should be placed as near to the rear entrance as possible, as the food stuffs can be placed in it with the least trouble and steps. A cabinet can be placed over the refrigerator for further storage space. Care should be exercised to see that the door of the refrigerator swings in the proper direction.

The Range and Food Preparation Centre

The range should be so placed as to make the distance from the dish-washing centre and refrigeration centre as short as possible, to save steps and time. Next to the range a baking cabinet should be placed with all the necessary gadgets and equipment, along with a durable and serviceable top, preferably of hardwood. This baking cabinet should have drawers, metal lined for flour, sugar, bread, etc.; possibly a tilting bin. The upper cabinets should have a place for condiments. It is thus possible to organize all the needed equipment to do the baking job without having to run to and fro for the needed articles.

The Cabinets

The different features and functions of the many gas and electrical appliances have been so well publicized that they need no elaboration but the advantages of factory-made cabinets which operate and look like furniture when installed are perhaps not so well known. Here are some of the details to look for:

Doors that do not warp or crack, with offset hinges and hardware that functions quietly and holds the door securely. Adjustable shelves in the

(Please turn to page 50)

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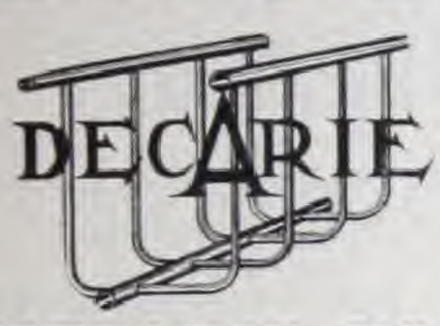

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upper cabinets. Drawers which slide on metal glides the same as your furniture to eliminate sticking and rattling. The base cabinet under the sink recessed to give you knee space. A smooth and permanent enamel finish on all cabinets.

Gadgets

The so-called gadgets are very important too. Corner shelves next to the window when possible are attractive, as you can place decorative articles on them. Racks for soap and cleaners on the door of the cabinet under the sink, a dishcloth rack on the other door or a sliding towel rack in a suitable place are happy thoughts. Others are: Condiment racks on the doors of the upper cabinets near the food preparation centre. A metal lined tilting bin to take flour or vegetables. Drawers, metal-lined, for bread and cake. Drawers for linen, cutlery and silverware. Breadboards for cutting purposes. Tray rack for lids, trays or papers. If a corner cabinet is to be incorporated—a revolving tray which holds innumerable articles. (This revolves on a rod so that the desired article is had with the turn of the tray). Broom cabinets with hooks and clips to hold brooms, mops, etc. Vegetable bins made so they can be taken out and cleaned with ease. A planning desk with pigeon holes for cook books, etc., also drawers for books and other information all collected in one place. An ironing board installed on the door of the broom cabinet or a wall surface type inserted into the wall at a convenient place.

Perhaps Plywood Will Solve Your Problem

Showing the versatility of Douglas fir plywood.

A GREAT deal has been heard about the structural merits of plywood—its unusual strength and rigidity, its workability and speed of application and its low cost. These qualities it possesses in a high degree, and they have given plywood an established position among modern building materials.

The wide decorative possibilities of plywood for interior finish, however, are not yet universally recognized. Yet plywoods laminated from Canadian softwoods such as B.C. Douglas fir, have proven to be, in their own right, as distinctively beautiful as they are structurally advantageous.

Owing to new finishing techniques recently developed, plywood has become a medium offering unlimited scope for the expression of individual taste, whether in color, tone, or texture. Fir plywood is now used for every interior purpose including halls, theatres, churches, clubs and restaurants, offices. In many modern Canadian homes plywood has been used throughout, subtly reflecting the contrasting mood and feeling of every room.

Available in large panels up to ten feet in length, plywood gives to walls and ceilings the striking beauty of smooth, unbroken surfaces. Joints can be either concealed with mouldings or rendered invisible with mastic for monolithic effect. Mouldings used to accentuate either the horizontal or vertical sweep of the walls are a decorative feature in themselves.

Specially formulated plywood finishing and decorating accessories are now available, either for interesting wood panel effects where the full beauty of the grain is to be revealed, or where the surface is to be painted over. Now attainable by these methods is an unlimited number of strikingly beautiful decorative effects that heretofore were considered impossible on fir plywood.

Experience has proven that the first essential to practically any kind of satisfactory decorative treatment on plywood is proper sealing. A clear synthetic resin sealer has become practically standard for this use, as it was developed for application on this type surface. This resin sealer and primer penetrates into the wood cells, binding down soft and hard grain wood fibres alike, and making a smooth, even surface that stays smooth under any kind of subsequent decorating medium—oil, stains, paints or enamels. In addition to controlling grain raise, this sealer also acts to prevent moisture absorption and decay.

Apart from its beauty of finish, plywood takes on additional merit for interior work through its extreme flexibility of form. This not only permits the large wood panels to flow smoothly, effortlessly over flat and curved surfaces alike, but allows the utmost scope for built-ins and integration of such decorative features as recessed lighting, seating alcoves, stepped-in ceilings and the like.

Rich with suggestions for interior planning is the accompanying picture of a basement games room in a Vancouver home, which owes its individuality entirely to plywood. Wall panels are here applied vertically with a special veed joint. The ceiling is veed in large squares and is embellished by a stock cornice moulding, bandsawn from plywood. Other plywood features are built-in wall bookcases and cupboards, recessed ceiling lights, and an interesting diamond-shaped design surmounting the fireplace, achieved with plywood moulding. Even the doors are of plywood. These are the new-type, low-cost slab door, made of scientific grid construction.

All features of this games room are skillfully related to produce the pleasing effect of a planned unit.

Handsome new storefront of the Yolles Furniture Co. Ltd, on Yonge St., Toronto, which is about 50 feet wide and 26 feet high. All plate glass is encased in Nulock stainless steel sash and the surrounding area is in polished black vitrolite. Trim around the entrance as well as the doors are also of stainless steel. The series of panels in the facia are enclosed with Rayex Glass, which is sanded on one side to diffuse the light properly at night. This light serves a two-fold purpose, giving the front a bright appearance and also silhouetting the stainless steel letters on the light box.

British Glass and Canadian Ingenuity Have Done Much for Building Industry

GLASS is just another of those things which we take for granted. Its use is universal. Every building erected which has an opening—and what building hasn't—uses glass. It is as ubiquitous in our building operations as bread is in our diet.

And in its way glass is doing its bit to help win the war. Or perhaps what we should say is that "Glass is helping Britain to win the war." Ninety per cent of the glass we use in Canada comes from Britain and that in turn is providing credits which help the Old Country to finance its stupendous war effort.

Glass is made from common minerals; silica, soda ash, salt cake, and limestone, and of all the products exported by Britain, glass can be considered one of the most suitable, as its ingredients and coal used for melting all come from the very earth itself.

No sea-lanes must be kept open to import into Britain the raw materials from which it is made. Its manufacture keeps in operation a large capital investment that cannot be used for other purposes, and its shipment to all parts of the world including Canada, helps to fill the outgoing ships which must sail as soon as cargoes are discharged, to bring back more food stuffs and munitions.

It is therefore just a "natural" export so far as Britain is concerned, and a "natural" import so far as Canada is concerned. Britain is our natural and only source of supply now that Belgium is cut off from the world markets. We need the glass and they need the money, so that is why we say that this trade is helping to win the war.

During 1941 Canada imported over 40,000,000 square feet of glass from England to meet a market calling for 48,000,000 square feet.

The great bulk of window glass manufactured in England prior to the repeal in 1845 of the heavy excise duties on glass was "Crown" the bull's-eye or bullion type only seen nowadays in antique cabinets. This was followed by the cylinder process leading today to the automatic machine-drawn sheet glass familiar to everybody.

Polished plate glass was first made successfully in France in 1691 by first casting glass on a table which took 10 days to cool, after which both sides had to be ground and polished. Today, British polished plate glass is cast by a continuous process, the cooling taking only 4 hours, and the grinding and polishing done on both sides simultaneously, affording a perfectly flat piece of glass.

Cast plate was not manufactured in England until 1773, when the British Cast Plate Glass Works

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BRITAIN DELIVERS THE GOODS

British Glass

(Continued from page 52)

started in St. Helens, Lancashire. In those days plate glass was very expensive; a price list dated 1794 shows that the cost of plates 117 x 76 was £400, or $2,000.

Rolled, wired, and figured cathedral glasses are also rolled onto a table, the different patterns on the glass being made from impressions on the roller.

Many hundreds of thousands of feet of this glass have been imported from England during the past year for the aircraft factories, armament, gun and other war factories now erected throughout Canada. Wired glass was developed principally to give protection when broken, as splinters do not fly. In recent bomb blast tests in England, British wired glass has proven highly resistant to blast.

Vitrolite colored structural glass as seen on the face of most store-fronts, is one of the latest developments in glass manufacture. The Mersey Tunnel in England was lined with 180,000 feet of Vitrolite.

One of the most recent developments in Canada is the manufacture of Duplate Safety Glass, both laminated, and armourplated, used by all the manufacturers of automobiles. Aircon, the double glazed sealed glass unit so necessary in air-conditioned buildings for insulation purposes, has also been recently developed in Canada. Thermolux, a laminated glass interleaved with glass fibre has been developed for light diffusion purposes; all of these are made from British manufactured glass, and the later fabrication being done here in Canada.

The future undoubtedly holds many startling developments, fibre glass insulating, and woven fibre glass fabrication, being two recent developments in little explored fields.

We are a nation of sun-worshippers. Who knows to what extent our lives may be changed by experiments steadily going forward with this magic material!

Plastics Replace Aluminum In Decorative Trim

Once again necessity has proved the mother of invention and architects, builders and contractors who are denied the use of aluminum because of war needs are finding a splendid substitute in plastics for decorative trim.

Modern manufacturing methods have developed colorful nosings, edgings, cap sections, coves and wall trim for sinks, furniture, bars, showcases, walls, floors, fixtures, etc. They are made of cellulose acetate and cellulose butyrate plastics and are said to possess many admirable properties making for ease of application, utility and adaptability. They come packaged in units and labelled for quick identification, providing unlimited scope for original treatments in connection with surfacing materials of various kinds.

★*For Free Inquiry Service please turn to page 5*

The Romance of Heating in Canada

By A. J. DICKEY

FIRST, food. Then clothing and shelter. Then warmth. This is the order of the urgency of man's material needs over most of the globe. It gives the heating industry an importance which belies our usual unheeding acceptance of warmth and comfort in the buildings of today. The legend of Prometheus' punishment by the gods for giving man the use of fire and thus raising him almost to the level of the gods themselves is indicative of the regard in which the ancients held this source of energy and comfort.

In Canada, until as recently as 250 years ago, the wigwam "bonfire" and communal fireplace of the Indian showed little appreciable advance beyond the earliest recorded techniques. With the white man came knowledge of iron. The stove followed the gun and knife across the continent. Soon the famed Quebec Heater was radiating good cheer in a thousand trading posts and frontier cabins. There followed roughly a century and a half of heating history devoted primarily to the elaboration of the "stove" idea. Even as recently as 1875, social distinction in many districts bore some subtle relationship to the size, number of lids, and the hot water storage capacity of the kitchen range. And the manufacture of stove polish vied with the buggy whip industry.

Heating development beyond the stove depended upon social progress in Canada to pose new problems, and upon technical progress to present new answers. For example, the multi-storey building made the long trek from woodpile to kitchen wood box still longer. Fire hazards went higher as buildings did. Tending stoves became burdensome and costly in larger buildings. An integral part of Canada's growth was an increasing need for central heating. How this need has been filled is so extensive a subject that both skimming and compression must be used to deal with it. Commercially, it is a story largely of the present century, although parent ideas in steam, hot water and hot air heating go back much further.

If stoves represented the forefront of heating development in Canada in 1875, steam had usurped this position in larger buildings by 1900. A good part of the impetus to steam heating was given unwittingly by Thomas A. Edison through the incandescent electric light which he successfully produced in 1879. Individual steam-operated generating plants for lighting were being installed in larger buildings in Canada by 1900. These provided a source of "live" steam and, in addition, exhaust steam from the engines. Why not use the exhaust steam, supplemented by "live" steam, to heat the buildings? Wrought iron piping, of standard sizes and threads established by Robert Briggs in 1862, was available for this type of service. So were cast iron radiators. These earlier steam heating systems were of two-pipe, two-valve design, with air vents on the radiators. They used steam pressure to create circulation and displace air from supply piping and radiators, with condensate flowing by gravity through the return system of piping to some form of trap and thence to steam-driven boiler feed pumps. At the same time there was a tendency in residences and small buildings to push the stove, despite all its aesthetic pretentions, out of the living quarters. Stoves are a concentrated source of radiant heat—the kind which heats where it touches—and people were beginning to get ideas of heating which would warm them thoroughly. The logical outgrowth was the development of the warm air heating system which essentially is a stove enclosed in a jacket through which air passes, absorbs heat, and travels

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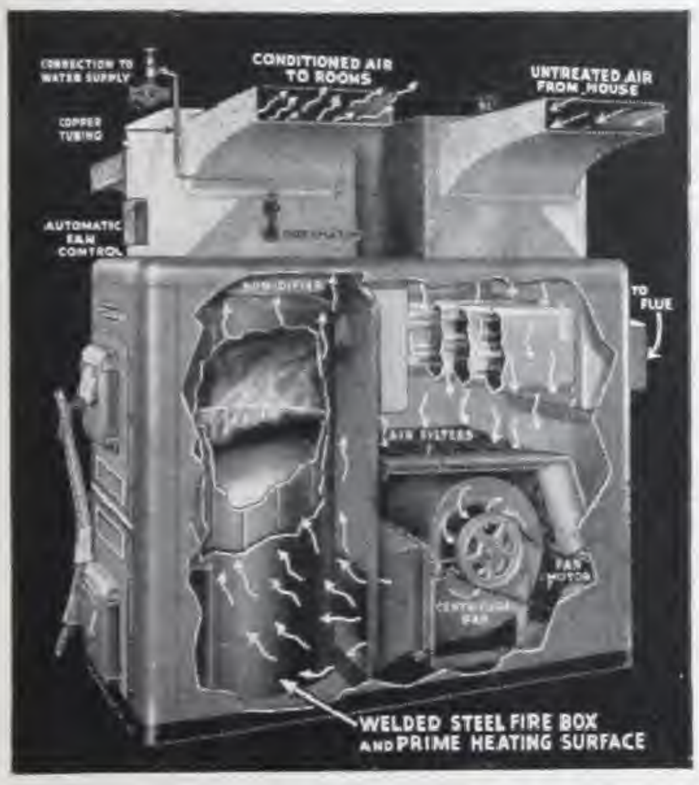

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by ducts to the rooms to be heated, with cool air either being drawn from outside or, more commonly, recirculated by separate ducts back to the furnace. The difference in density between the columns of warm and cool air was the motive force creating circulation. Gravity hot water heating using physical equipment similar to the early steam systems—boilers, radiators, pipe, and fittings—developed abreast with steam, although its early field of application was in smaller and lower buildings. Ventilation and air conditioning were functions performed by the open window. Such was the technical level of heating in Canada at the turn of the present century. Rather than trace its development step by step through succeeding years, we come to the present day to picture progress by the contrasts we see. One enters a building to discover it is being heated by steam at so low a temperature that the hand can be placed on the radiator without discomfort. In another, radiators are conspicuous by their absence or rather by their concealment. In a factory, in which one might have expected to find walls plastered with pipe coil radiation, there are, instead, comparatively small heaters located above the working space and driving large volumes of heated air either directly or obliquely downward. In a residence, the successor to the warm air furnace in a gleaming casing contains a fan to give forced air circulation, a filter to remove dust, and a water spray to provide humidification. In a restaurant and a theatre, ventilation includes cooling among its several functions. In place of hand-fired boilers, one finds stokers, blowers, oil burners and gas burners all under automatic controls designed to maintain required conditions of pressure or temperature. Hot water systems have changed from "open" to "closed" systems so that higher temperatures may be carried without the water boiling; and in larger installations circulating pumps are used to give rapid distribution of the heating medium, while regulating valves govern its temperature in accordance with heating demands. In this profusion of ingenious devices certain major trends and developments are to be observed.

Striking changes have taken place in radiation since the ornate and cumbersome "rad" of the 1900's. The first trend was in the direction of slenderizing radiators to give them better appearance and more capacity per ton of iron. Still more recently the commercial production in Canada of extended fin surface radiation fabricated out of non-ferrous metals has built popularity for the "convector" or "concealed radiator." This type of radiation typically consists of copper tubes upon which fins of copper or other non-ferrous metal are applied to multiply the area of heat transfer surface. Tubes are welded to supply and return headers and the assembly, having but a tenth the weight of a cast iron radiator of comparable capacity, is installed in a cabinet or a recess in the wall. The cabinet or recess enclosure is a functional part of the radiation because it forms a chimney necessary to establish the convection currents by which convectors largely discharge heat. Convector capacities are thus de-

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termined by the height of the "chimney" as well as by the dimensions of the heating element. This type of so-called radiation is now widely used with both steam and hot water heating in commercial and residential buildings because it saves floor space and permits more unobtrusive and attractive disposal of the heating surfaces.

Continued Progress

Another application of extended surface radiation has effected a similar revolution in industrial heating in Canada during the last ten years or so. The heat output from a radiator is a function of the volume of air passing over its surfaces. Why not increase the output by putting an electric fan behind the radiator? The unit heater has been the affirmative answer to this question. It employs a copper extended surface radiator through which a fan drives relatively large volumes of air. In industrial buildings which, by reason of large glass areas, typically have a high heat demand, the unit heater in its various forms has almost completely supplanted the pipe coil and cast iron radiator. Unit heaters can be suspended from ceilings to drive heated air vertically or horizontally, or they can be set on floors to discharge heated air in any or all directions or through ducts (where centrifugal type fans are used). The reason for their wide use is found in this weight contrast. A typical propeller-type-fan heater weighing 750 pounds delivers 480,000 British Thermal Units per hour whereas it would take 12,000 pounds of cast iron radiation to provide an equal output. Extended surface or fin type non-ferrous radiation is also almost exclusively used today for heat transfer in ventilation, in air conditioning, and in automobile engine cooling.

Steam heating system development can be arbitrarily divided into two phases. From about 1900 until the late '20's, development primarily concerned itself with circulation of the heating medium to give quiet, positive steam distribution at low pressure with positive return of condensate and venting of air. By the end of the period, vacuum return line systems for large buildings and gravity return systems for smaller ones, were able to circulate steam successfully at a few ounces of pressure. With these problems behind, research turned more particularly to the problem of control. With buildings necessarily equipped with enough radiation to keep occupants warm in zero weather, what should be done to reduce the heat output in mild weather?

Typical among today's answers to this problem of control is a steam heating system which automatically varies the temperature of the steam and thus the output of radiation and steam supply piping as weather demands fluctuate. In cold weather this type of system distributes steam at temperatures around 218° F.—a little higher than teakettle temperature. As the weather grows milder, it correspondingly reduces the steam temperature to a minimum of about 135° F. In very mild weather, it further reduces heat output by restricting the volume of this low-temperature steam admitted to each radiator. Thermostatic controls for this par-

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ticular type of system employ electrical resistance and Wheatstone Bridge principles which make possible the use of thermostats consisting of nothing more than coils of copper wire. These coils of wire, by reason of their varying resistance to an electrical current under varying temperatures, evaluate heat loss rates, govern heat supply to equal this demand and, additionally, permit an engineer in the boiler room to "read" at a moment's notice the temperature at a thermostat location possibly twenty storeys above him.

Another type of steam system achieves control primarily by "metering" the volume of steam admitted to the radiation under modulating thermostatic controls directly influenced by outside weather changes. The search for comfort through automatic control has produced an amazing variety of devices including thermostats, pressurestats, aquastats, humidistats, and electrically and pneumatically operated control valves of many types. These have been adapted to govern steam, hot water and warm air heating which three basic types still dominate the heating market in Canada, to govern coal, oil and gas fired combustion equipment, and to govern ventilation and air conditioning equipment.

Air conditioning is a development of ventilation, both of which are allied to heating. Air conditioning may be broadly defined as control of some or all of the following "conditions" of a supply of air to an enclosed space: temperature, volume, movement, cleanliness, humidity, odours, bacterial and ionic content. In other words, a supply of air at a predetermined rate is heated up to or cooled down to desired temperature, is scrubbed, filtered, dampened or dried as may be needed, is possibly deodorized and subjected to irradiation, and then is distributed through ducts to rooms where it is delivered at specified velocities by means which prevent drafts. Air conditioning thus is essentially ventilation with the added dramatic function of summer cooling. Buildings may be completely or sectionally air conditioned. Theatres, restaurants and shops are widely air conditioned, while larger buildings—hospitals, hotels, multi-purpose commercial buildings — have air conditioning equipment to serve special sections.

What of the industry which has wrought these changes in heating standards? Because of the extent of identity in manufacture and market outlets between heating and plumbing, both can best be treated as a single industry. It has a capital investment in Canadian plants and equipment in the neighborhood of $30,000,000. Approximately 160 manufacturers are located principally in Ontario and Quebec, but the number of factories in the Maritimes and in Manitoba probably indicates a decentralizing trend. These 160 plants employ over 5,000 persons in the direct manufacture of heating and plumbing equipment of a present annual value, at factory prices, estimated at well over $15,000,000. About 100 wholesale firms and branches from coast to coast, employ possibly 1,500 people. — (From "Agricultural and Industrial Progress in Canada," published by the C.P.R. Dept. of Immigration and Colonization.)

Banish Damp Basements

(Continued from page 27)

Next, see that your gutters and downspouts are in order, not only sound and clean, but large enough for a capacity storm. If your downspout cannot discharge on a slope that will carry the water away, connect it with a draintile draining into a dry well or the sewer.

Where there is still danger from surface water, drain the foundation walls themselves. Open joint draintile can be laid at or below the level of the footing to carry off excess water.

When ground water is present near the level of the basement floor, moisture may enter by capillary action. This must be a consideration when deciding the thickness of the floor. Even solid concrete, properly used and thick enough to withstand the pressure, is not watertight without waterproofing. With other materials special care must be taken to insure watertight joints. In all cases waterproofing will be necessary in addition. Some waterproofing materials are mixed into the concrete itself. Membrane-type waterproofing, impregnated felt or similar materials, can be mopped onto the outside of the wall and over the rough slab under the finished floor with hot pitch or asphalt. Or damp-proof cement plaster may be applied either to the interior or exterior or both.

Whoever has had his basement flooded even once knows the value of a floor drain that works. Such a drain can be discharged into a dry well or onto a well-drained slope. If, as is most common, it is discharged into the sewer, it should be equipped with a trap or, preferably, a catch basin to provide a water seal between the basement and foul gases emanating from the disposal line. When this trapped drain is seldom used, and there is likelihood that the water seal may evaporate, an automatic trap seal valve can be installed which connects with the water supply line and automatically keeps the water seal intact. Further flood insurance is the sump pump, which occupies a shallow pit in the basement floor and automatically dispels any water which may run from the floor and collect in it. And one of the most unpleasant aftermaths of a spring storm can be controlled by the installation of a comparatively inexpensive automatic back-water valve which will prevent the sewer from backing up through the floor drain or through basement plumbing fixtures.

Dampness resulting from condensation is best fought with ventilation. If your basement has less than one square foot of window for each three to four hundred cubic feet, increase the window area.

A new plumbing system, competently installed, is guarantee against any basement moisture from that source. But if you are modernizing an old basement, it would be wise to include professional inspection of all pipes and connections in your campaign for dry comfort.

★*For Free Inquiry Service please turn to page 5*

What is the Measure of a Well Designed House?

(Continued from page 22)

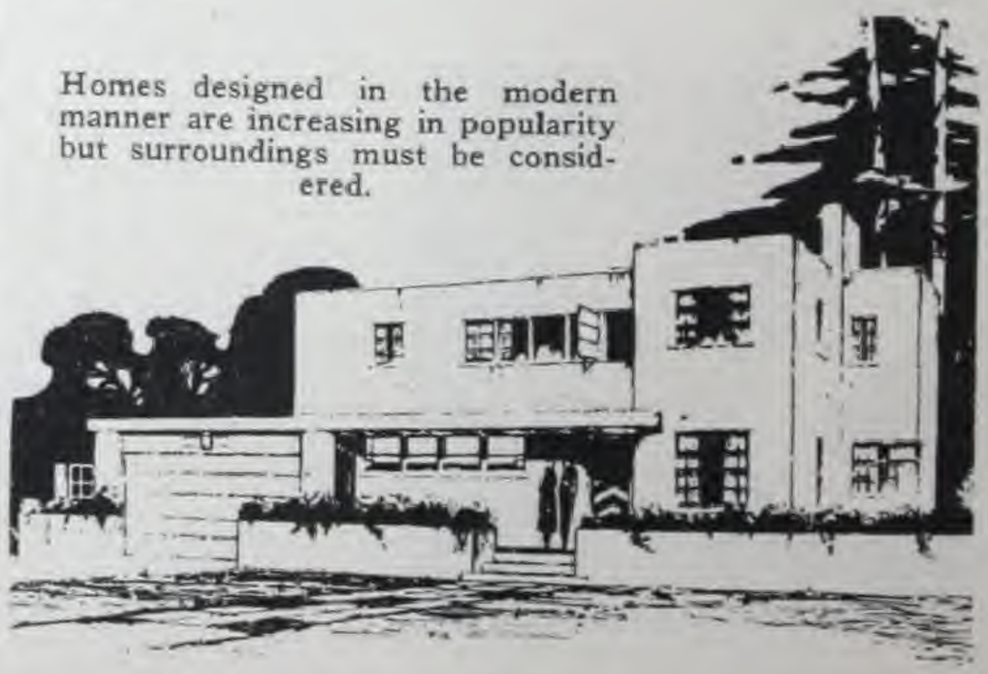
for neighbors and friends to look at. This does not mean that the house will not be beautiful. To the contrary, a house, designed and built as I have outlined, will acquire a new beauty, a beauty of its own, just as the automobile acquired its beauty once it threw away the precedent of the coach and wagon. Why should a modern house look like the old Colonial house of grandfather's day? He could not have had the kind of house that the twentieth century carpenter, brick layer, and mechanic can so easily produce. Windows alone alter the whole appearance. In the comfortably heated house they can be wide and high, to give a view and let in the sun. Our methods of construction make it a simple matter to place the windows exactly where we get the exposure and view we want. We are not bound by symmetry of construction or form to put them in a particular place, regardless as to whether they satisfy us or not."

Undoubtedly there is need for still more attention to the problem of small house design. Many of the great architects of our time who are willing to break away from tradition to meet modern needs, find greater profit in larger structures than in the small home. The architectural profession as a whole has not always done its best by the small house and builders have not always been prepared to work with architects in lifting the level of design. This is changing with the realization of the need for greater co-operation all around.

Briefly summarizing these impressions, it seems: (1) There is no final authority as to what is good architecture; (2) Wide variety of tastes requires a wide variety of treatment; (3) The structure should reflect the culture and needs of the occupant; (4) There is a tendency away from period architecture; (5) More attention to the small home is being given by leaders of the architectural profession; (6) The homes of the future will be more functional in character, an expression of the needs of the occupant carried out in modern materials and in a modern fashion.

It takes many kinds of people to make a world, and likewise it takes many kinds of houses to satisfy the public.

Homes designed in the modern manner are increasing in popularity but surroundings must be considered.



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THERE are few man-made building materials which have come down to the present day with such a heritage of glamour and romance as tile. It is at once, one of the oldest, most versatile and artistic of building materials. It satisfies three fundamental demands of the home builder: the popular desire for colour, the necessary need for sanitation and the economic requirement of durability over an indefinite period.

Tile is today taken for granted in our bathrooms and lavatories. Modern housekeepers long for tiled kitchens. Tiled entries, tile-faced stairs, tiled sun rooms, tile wall fountains, tiled pantries and breakfast nooks, and tile-floored terraces are all desired for the charm and distinction they impart.

This desire for tile may be gratified by even those with slender purses if the planning is done with care. Tile is essentially a part of the structure. The first cost of tile is its last cost. The initial cost may be greater, yet properly laid tile never has to be repaired or replaced. Moisture does not affect them or friction wear them out. Tiles, being water, fire and stain-proof, are easily kept clean in the usual routine of housework.

Tiles add appreciably to the value of a house. Thinking in this wise many owners when building have tile work done and, if necessary, forego temporarily the purchase of such items as can be more easily added when funds permit.

Another consideration of no small importance is the effect upon the financing institution to which the owner may go for his mortgage. If the specification calls for a liberal amount of tile work rather than a number of "improvements" of less durable and more questionable nature, the request for a loan is apt to receive more favourable consideration. Those who lend money to builders realize that tile is a permanent improvement that includes no expensive upkeep cost.

While handmade tiles are costly, those made by machine are far less expensive and are unbelievably lovely. Brilliant enamel tiles, soft satiny pastel shades, with or without decorative motifs for walls;

and dull, rich quarry or unglazed tiles in various shapes and sizes are offered for floors. The buyer is not bound by standard combinations but may create individual patterns and colour schemes of his own from among the variety offered.

While we may exercise individuality in choosing colour schemes and patterns, let us be cautious. A pattern or colour scheme that may be a fine expression of personality to one may be out of place in the home of another. Fortunately there is an almost unlimited variety of patterns and colour combinations in tiles to satisfy all tastes and preferences.

This variety is especially evidenced in the colorful modern bathroom, where molding and wainscot offer endless opportunity for decorative effects. Should we choose pastel tiles for the wainscot and wish to indulge in some of the decorative water motifs such as wild ducks winging downward, fish in various groupings, mermaids at play, bubbles and water babies, there are many of these tile pictures available. Of course, these also add to the initial cost. The dainty porcelain tub and other coloured fixtures, with matching shower and window curtains, rug, hampers and linens, make the modern bathroom a colourful and luxurious addition to the home. Special non-slip tiles are popular for bathroom floors. The razor blade slot tile that may be built into the wall along with the tooth brush holder, bath grip, towel bars and soap dish solves the problem of safe disposal of used blades.

A spotless, convenient kitchen is likewise the dream of all housewives. Here again tile is an appropriate finish. Non-slip tiles for the floor may be plain, patterned or bordered in colour as budget permits. In the same way a high tiled wainscot makes a frame for the furnishings. Glistening sink set with tile, including double drain boards, and plenty of conveniently placed electric outlets, leaves little to be desired.

If the plans include a laundry it is desirable to finish both floor and walls with tile, the walls, at any rate. Tiles may also be used to increase the interest that centres about a fireplace. Fireplaces vary with the architecture of the rooms in which they are placed. For a dining room or library fireplace there are tiles for the entire mantel, chimney breast, spandrel and lining. Then there are the field stone and tile combinations, rough cement or plaster and tile, and many of the tiled hearths are finished with black structural glass.

For the small room the Spanish corner fireplace is attractive. The chimney breast, coming to a point at the ceiling, may be entirely of tile, or of plaster with tile inserts, having tiny shelves for decorative fire figures arranged at irregular intervals. The pointed or semi-circular hearth is raised from the floor and may be faced with tile.

If there is a basement game room or den, its floor also may well be finished with dull red unglazed square tiles.

Outside the house the tile-floored terrace may be a rich gray if the house is of stucco, or Indian red if the house is of brick.

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Crash Helmets for Homes

(Continued from page 23)

Asbestos hexagonal roofing by Johns-Manville lends interest to this trim, small home and blends perfectly with its stone. walls.

twenty years at least. Some roofing materials, of course, will last the life of the building in spite of the exposure to every blast that blows and extremes of heat and cold.

Wood shingles must be properly laid to give maximum service. The overlapping spacing and nailing are all as important as the quality of the shingle itself. Expose one-third of the length to the weather only, the pitch being at least six inches to the foot. The nail is as important as the shingle. Check on this because its life must equal that of the shingle. Experts say, "Poor shingles with good nails make a better roof than good shingles with poor nails."

Asphalt shingles or strips of shingles are essentially a manufactured product, being made or built up in standard grades and priced accordingly. There is such a variety of weights and types that almost every roofing condition can be met and in addition provides beautiful color combinations at low upkeep cost. They are definitely fire-resistant and meet the requirements of building codes. Too much colour is inappropriate to the roof of a house one has to live in for a long period of time. Asphalt shingles need not be gaudy in appearance. In the hands of an architect or builder with good taste, asphalt shingles can be used as effectively as a woman completing her costume with a chic hat.

Asbestos shingles are heavier in weight than wood or asphalt, being made of asbestos fibre and cement, welded under pressure. Their natural color is silver grey but the variety of tones and color combinations give the architect wonderful scope for contrasts and distinctive effects. They are fireproof, weatherproof and economical because they do not require attention. They come in a number of shapes.

Tile and slate shingles are usually considered in the same category because of their weight. If you have planned for wood shingles and the framing is up, you cannot change your mind in favour of slate because you require stronger framing to carry the weight. Slate shingles are split from the natural rock into thin sheets. They are impervious to water and fire and come in shades ranging from black, blue and black-gray to blue-gray, purple, green and red as well as mottled effects. All tones are subdued. On the other hand, tile shingles, being made from clay, have bright colours the same as brick. Both these materials are everlasting so far as wear is concerned, but the occasional one will split and require replacing. Tile roofing provides a more rugged effect than slate but both have been used for hundreds of years to cover the homes of the wealthy. The cost of slate is determined by the distance it is hauled from the quarry and has to be imported from Pennsylvania or Vermont. In the same way, clay roofing tile is not made in Canada and must also be imported.

Copper roofing is now made in lighter weights and narrower sheets for homes, and prior to "priorities" was becoming quite popular. Its use is prohibited now till after the war.

When arranging about your roof make specific mention of the "flashing" which is the same as the sweat band of your hat or the lining of your coat. It is an extra layer of material placed over joints to keep out the weather, especially at places vulnerable to moisture such as nail holes, angles and joints. These later come in valleys, hips, chimney bases, soil pipes and vents, parapet walls and where different kind of materials come together. The flashing should be as long lived as the roof itself and where exposed, less durable metal should be kept painted.

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House interiors can be made to effectively reflect the personalities of those who occupy them, as witness this vista of a streamlined stair and living room in a home at Crystal Beach, Ont. Ten/-Test with moulded edge panels was nailed directly onto wood studding and joists to form the walls which were then painted.

When It's Time to Think of Woodwork and Walls

IT is not so many years ago that the only choice of the home builder for interior wall treatments lay between plaster and wood panelling. Today the ingenuity of man has widened that choice to include an amazingly wide variety of panel boards possessing properties of beauty, insulation and strength that recommend them highly for an infinite number of uses.

Our choice will probably be governed by the surface decoration desired: paint, wall paper, wall fabrics, wall linoleum, textured plaster or natural or stained wood. To a large extent these decisions influence the remaining choice of flooring and trim.

The advantage of plaster, which is not possessed by other finishing materials, lies in its ability to provide a smooth straight wall or ceiling over an irregular base.

Plaster has little strength in itself; it depends upon a rigid structure and a firm, secure base. It is usually the preferred material if walls are to be papered or painted, especially if the structural walls are not perfectly true. Similar effects can be obtained with modern plaster boards applied with special reinforcing tapes that conceal the joints and leave a smooth surface.

Wall boards are available in almost endless variety. They are made of asbestos-cement for hard tile-like or marble-like finishes, of fibrous insulating materials for softer and often interestingly textured effects, and of gypsum in tile markings or plain surfaces. The latter are often used as a base for interesting textured surfaces produced with plastic paints.

In the same category falls plywood, which may be used either for natural wood finishes or as a base for paint. Plywoods veneered with rare decorative woods give an appearance of richness far greater than their cost would indicate.

All of these materials have one advantage in common; they eliminate the dampness brought into the structure by fresh plaster and save the long drying period which plaster demands. Most of them, however, require a decorative handling which uses the joints between the units as a part of the design.

And now for the "trim!" Good woodwork, like all good furniture, combines beauty, utility and serviceability. The time has not long passed when only the owners of the finest residences could afford such woodwork. In more recent years the quality and beauty in woodwork which results from careful selection of materials, authentic designs, precision workmanship and skillful construction are

Birds Eye View of Circular Staircase. The railing at the window is removable. Drawings by Messrs. Kaplan & Sprachman, architects, Toronto

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available at reasonable cost for every home whether it be in the $2,000 or $20,000 class.

Woodwork is an all-inclusive term embracing windows, frames, doors, mouldings, cabinets, mantels, stairs and many other articles of wood which are installed in a home for its beautification and for the comfort of the occupants.

Wood windows and frames are accepted upon their centuries old record of service, yet the improvements made within the last few years offer today's home builder greater durability, easier operation, weather-tightness and economy of installation such as were not available at any price 15 years ago.

Windows are now prefabricated in sizes ready to slip into the frame without further fitting, or may be purchased completely installed in the frame with high quality weather-stripping and balances or weights fitted and adjusted so that the entire unit is ready for easy installation in the wall. Such windows provide true economy because of the low upkeep necessary and the substantial savings in fuel which they make possible.

Doors can make or break the beauty of a home. Selection of an appropriate, pleasing design of entrance door for the particular architectural type of the home, whether traditional or modern, can be easily made from the wide variety of styles which the retail lumber dealer offers. For the Colonial home, panel type doors are most appropriate. These are available with or without glass openings and in a variety of arrangements of panels. Modern effects are obtainable by the use of flush or slab doors which may be grooved or plain and may be had with or without glass openings.

Interior doors are equally important and their selection should receive as much care as the choice of furniture. Doors which readily receive and hold enamel finishes, while they may be a few cents higher in first cost, will prove to be economical in the long run. The sanding and preparatory work necessary for each repainting is costly and bother-

Wallboards and plywoods are particularly suitable for wall treatments of recreation rooms as shown in the basement retreat above. Ten/Test in natural color was used here with suntan moulding.

some, so good finishes should be used in the original paint job.

Who has not observed the remarkable transformation which takes place during the "trimming out" of a house? The installation of window and door trim, base mouldings and perhaps a ceiling mould, stair balustrade, kitchen cabinets, and possibly a mantel and a china cabinet immediately converts a rough, unfriendly house into an inviting hospitable home.

Pre-Assembled Cabinet Work

It is therefore apparent that too much stress cannot be laid upon the importance of careful selection and proper installation of the woodwork. As is true of windows and doors, many retail lumber dealers can provide at lost cost correctly designed stock mouldings, stairs, mantels, kitchen cabinets, china cabinets, linen cabinets, telephone cabinets, ironing board cabinets, and many other articles indispensable to living comfort.

Selection of the woodwork should be made before the plans for the house are completed, or at least before construction is actually started. If the carpenter is supplied in advance with the exact sizes of all cabinets which are to be built into the wall, the necessary openings can usually be prepared without added cost. Furthermore, door openings, window openings, and built-in cabinets can then be so arranged as to preserve pleasing proportions and proper balance in all of the rooms. Your retail lumber dealer can supply all of the necessary "opening sizes" for all items of stock woodwork which you select.

Good woodwork requires no more care than good furniture. The importance of its appearance, however, to the general appearance of the home bespeaks reasonable care. Woodwork should not be applied to freshly plastered walls until they have had an opportunity to become reasonably dry. It should be painted or stained and varnished immediately after installation. These precautions involve no additional expense and will be repaid many times over in the satisfaction derived from a lifetime of service.

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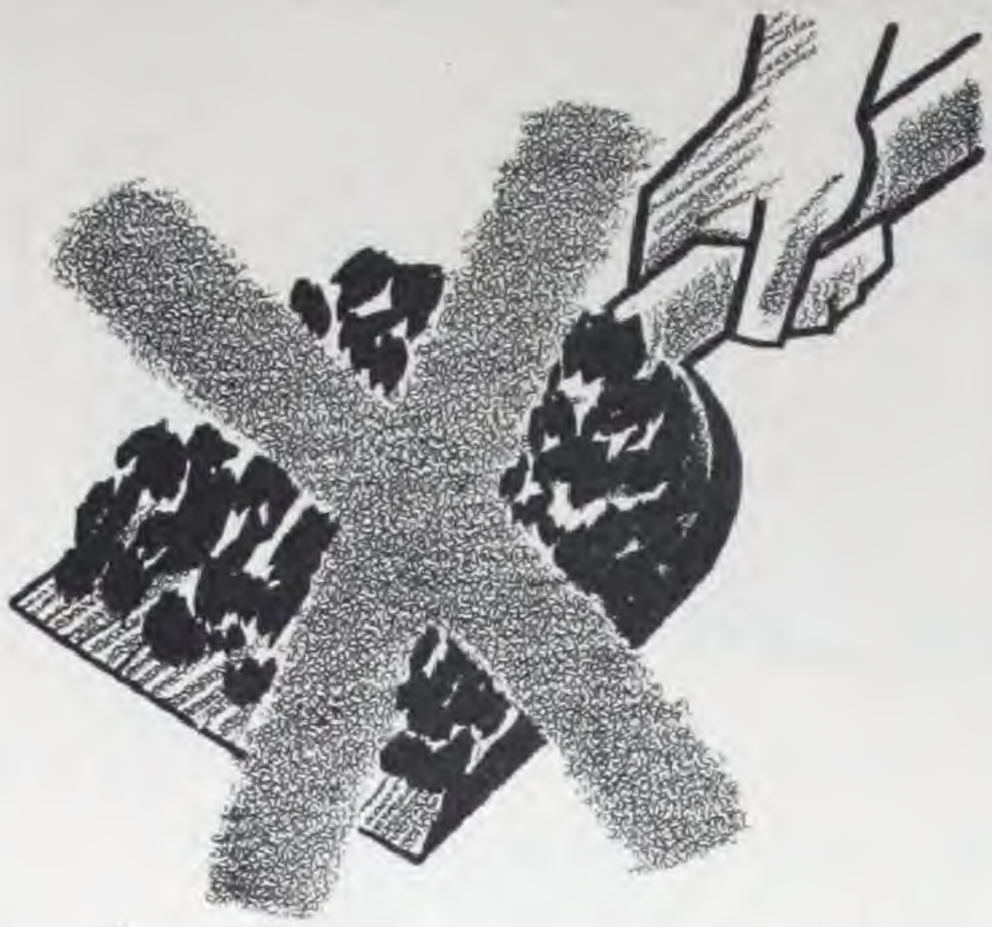

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Castle and Cottage Have Much in Common

(Continued from page 26)

taken down in the spring and there are various types of double-glazed sash which have been developed in conjunction with air-conditioning. Some of these sash include built-in weather-stripping and balances which make your windows weatherproof and foolproof as well as easy to operate.

Now we come to the aforetime unsuspected walls and roof, whatever material may have been used, and find that the nigger in the woodpile is "conduction". Solid, unbroken surfaces can transfer heat from one side to the other right through themselves if there is any difference in temperature. Outside air at 90° would eventually bring your inside air up to the same point although it might take several days and a change in wind would stop the process before it was completed. In the same way your inside temperature at 70° wants to warm up the sub-zero temperature outside and will do its darndest to do so with disastrous results to your fuel supply.

So here we introduce Mr. Insulation, the young superman of the building trades. Long and favourably known by other names in other trades his real name is "baffle". Any material that differs in substance from the one it is placed against, and acts as a lining to retard the passage of heat and cold, is insulation.

Science introduced it and science has produced various forms. They differ in type but whatever the cost, the results in fuel saving alone pay for the extra cost of material and installation in a few years. No one who erects a building for their own occupancy and which will need to be heated, will omit insulation.

Generally speaking, there are four "types" of insulation and each type can be obtained in many different kinds of material. It must also be remembered that while all insulation serves the same general purpose as "baffle", there are as many differences in quality as there are in substance, and substances are again good, better or best according to the thicknesses with which they are made. A heavy blanket will keep you warm in bed but so will a light eiderdown comforter. You pay your money and you take your choice.

Perhaps the most widely used form of insulation is the rigid board type which can be sawed and nailed and serves as a structural member either as a plaster base or for finished interior walls and ceilings. It can be had in cork, wood-fibre, paper pulp, cane-fibre and other materials and compositions compressed under high pressure. Thickness varies from one-half inch to four inches, the latter being used for flat roofs.

The second type is blanket insulation and also includes the kind known as "bats". Materials used are many such as eel grass, wood-fibre, rock wool, glass wool, and instead of being compressed into a rigid mass it is formed into rolls or bats covered with moisture-resisting paper. It is most commonly used as a stuffing between studs, joists and structural members and does not settle or sag as loose insula-

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tion tends to do. It is extremely flexible and easy to handle.

Fill, or loose insulation is stuffed into open spaces and must be tightly packed to hold up. Otherwise, in a short time it will settle down leaving unprotected spaces at the top of every structural opening. It is good for filling the floors of unfinished attics or for blowing into air spaces by means of a pneumatic hose after a house is built.

Reflective insulation consists of thin sheets of metal foil or paper or board covered with polished mineral pigment. It can be placed under the outside wall sheathing of a frame house, between the wall studs or on the inside face of the studs under some finishing material. The important thing is to have an air space on the shiny side.

There are some general rules applicable to all types of insulation. Because heat rises it is more important to insulate the top of your house than the bottom. If you are using your attic, insulate the roof itself, the same applying to a flat roof. If the attic is unfinished it is cheaper to insulate the floor. If you have no cellar, insulate under the floor of the first storey. Insulation must not be exposed to dampness and should be treated to resist destruction by vermin, termites or decomposition.

So, whether you build a cottage or a castle, plug the leaks and insulate. You will save much money in fuel besides being more comfortable and less subject to the vagaries of the outside weather.

White Pine Panelling Ever Popular

Knotty white pine panelling is extremely fashionable and popular. It does not have to be veneered and can be erected right on the job, which means a considerable reduction in cost. These facts have brought white pine very much to the front for wall panelling, wainscotting and interior trim, particularly in the lower grades containing good sound red knots. On account of its very low shrinkage, it is assured that the work will remain as installed for years under ordinary conditions, and its ability to take stain so satisfactorily gives it a decided advantage in this kind of work. In the selection of lumber for knotty pine panelling, care must be exercised to have the knots of the right type and in proper distribution and it is rather difficult in the average lumber yard to select from the ordinary stock sufficient lumber to make an artistic job of panelling in the vertical or Georgian styles. Architects and home owners should insist on securing their white pine panelling selected and properly seasoned at the mill for this purpose. The cost will be slightly greater if this is done, but the satisfaction in having the job right in every particular will much more than offset this slight increase. White pine for panelling does not have to be kiln dried but must be thoroughly seasoned.

Knotty white pine is very effective in Georgian panels. While some prefer the Georgian panelling made out of clear pine, which produces a beautiful effect, the general opinion seems to be that lumber containing a proper selection of small and moderate sized knots has more character.

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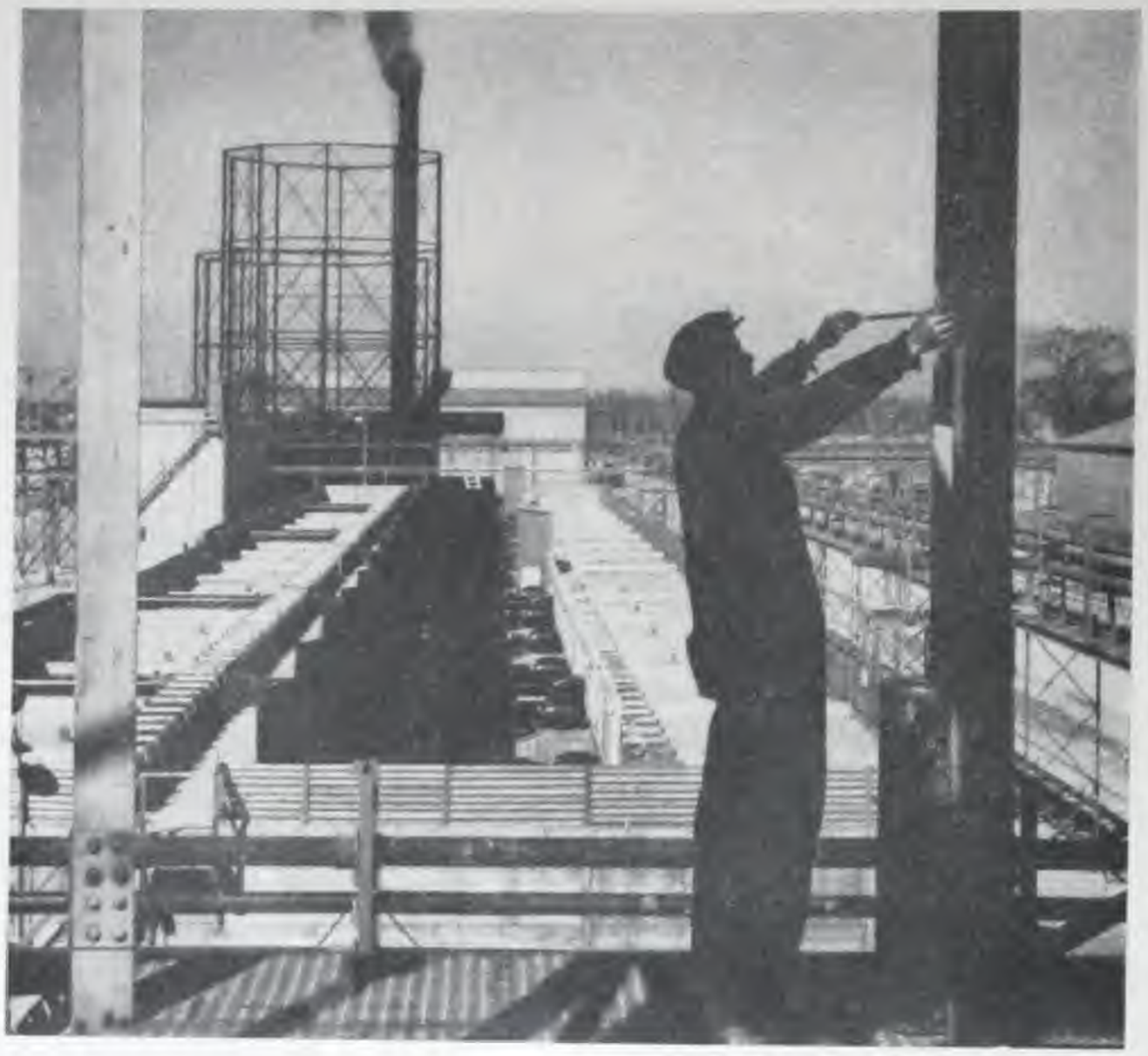

Structural Steel Industry Speeds Wartime Construction

By R. C. MANNING, M.E.I.C.
As told to J. A. Daly

IT has been observed that the degree of industrial progress in a country is in direct ratio to the quantity of steel produced. Similarly a basic necessity in any period of rapid industrial expansion is a well-equipped structural steel fabricating industry. Canada may be thankful that it had such an industry prepared to meet the suddenly accelerated demands of the past year.

The steel mills of Canada before war broke out in September, 1939, had an annual capacity of 2,000,000 tons. This has been stepped up to 2,250,000 tons by full use of existing plants. All the major companies are busy expanding and shortly a production of 3,000,000 tons per year is expected.

Before the war the structural steel fabricating industry was operating at about 30% of its capacity of 350,000 tons per year. This provided a considerable unused capacity from which to meet the demands of war expansion.

Even in a year of rush jobs, the structural steel fabricating industry continued to improve its techniques and thus contribute to the total of engineering progress. The past year has seen a much more general acceptance of welded steel structures.

Welding Advances

R. C. Manning M.E.I.C., Chief Engineer of the Canadian Institute of Steel Construction, outlined the year's progress in welded construction in discussion with a representative of MacLean Building Catalogue. Two Ontario plants have been erected during the past year in which arc-welding was used for all connections of the structural steel framework, both in the shop and on the job. One of these plants was the Lincoln Electric Co. building at Leaside. Details of welding the structural members on this job are pictured in this issue.

Main advantage of the welding method, Mr. Manning commented, is the continuity achieved. This is very well illustrated on the Lincoln Electric job where it will be noted that the purlins over the interior columns may be regarded as continuous due to the flaring out of the lower flanges of the purlin to form a welded connection with the columns flanges in a true arc, followed by the welding in of a filler plate into the opening created. This results in the elimination of gusset plates and, of course, there are no rivet holes in tension members. As a result, engineers laying out the framing of welded structures can achieve a considerable tonnage reduction by the use of lighter, but no more highly stressed members. Lincoln engineers estimated that on their job the saving amounted to 15 tons.

In Mr. Manning's opinion it is during the period of strict post-war economy that welded steel frame structures will come into their own. At present, there is room for considerable research on the subject of stress relief in welded structures. The day may come when even greater economies can be affected in the design of welded steel frames by application of X-ray analysis of the welds and subsequent treatment to relieve stresses as is now done in "Class A" welding of pressure vessels, etc.

Welding Approvals

As evidence of the increased acceptance of welded steel structures, Mr. Manning stated that the National Building Code, prepared by the National Research Council had been amended this year

(Please turn to page 80)

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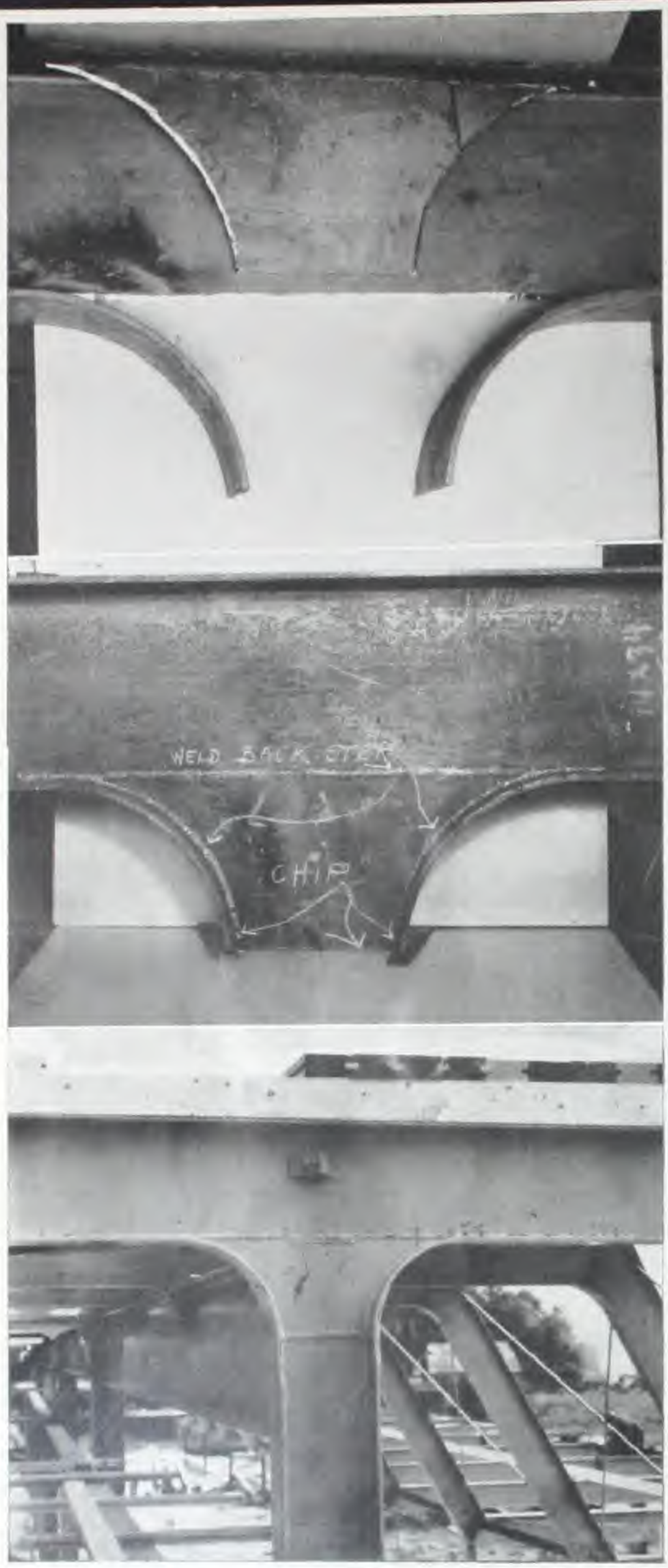

Welding details of Lincoln Electric Co. plant, Leaside, Ont., showing the sequence followed in making the connection at the head of the column for the main purlins. The lower flange of the purlin is cut away and curved to the proper radius. The filler plate is cut to shape and is placed on the lower part of the purlin web.

Centre: The assembled connection ready to be placed on the column. The adjacent edges of the filler plate have been welded to the purlin web and curved flanges.

Bottom—The complete joint in place. Strengthening plates have been added to the column flanges over the joint made by the column and purlin flanges. The bracket for the tie-rod connection is shown on the purlin web, made of a small angle shape welded to the web, through which the tie-rod passes.

to permit welding, and that the Ontario Department of Labour had also approved of welded joints for steel framing. It is believed that the approval of these authorities will pave the way for the amendment of local building by-laws. The approval by the Ontario Department of Labour, who must approve the plans for all commercial and industrial buildings, is contingent upon the welding following the specifications of the Canadian Engineering Standards Association, and upon the approval of all welds by an independent inspection company.

The C.E.S.A. have published three specifications relating to welding of steel frame structures. The first deals with the qualifications and experience necessary for welders; the second is a specification on welding rod; and the third outlines allowable stresses. No doubt each year will see increased research and more widespread utilization of welded steel frame structures. There are at present 250 welding machines in the fabricating industry.

Another important development of the year, pointed out by Mr. Manning, and which has also been recognized by amendment of the National Building Code, is a revision in the methods of figuring beam and column loadings in buildings of composite construction. The new method consists in figuring the strength of the reinforced concrete slab and the steel beam as a single unit, when the reinforced concrete slab is brought down to the neutral axis of the beam. It is not necessary that the remainder of the beam be enclosed. This method of figuring the loading may be used wherever the beam and slab are adequately tied together, and in actuality consists of taking cognizance of strength which has always been present in such structures but the advantages of which have been overlooked.

Considerable research has been done by the Canadian Institute of Steel Construction and by the Ontario Department of Highways, who are interested in applying the same principle to figuring the allowable live loads on bridge stringers. As a result, the National Research Council amended the National Building Code. A paper outlining this research will be published at a later date.

The importance of this amendment will be realized from Mr. Manning's statement that the allowable live loading of existing buildings of this type can be increased 35 to 50% depending on the individual structure. Conversely, structural engineers, designing new buildings with reinforced concrete floor slabs, and structural steel beams can effect large savings by using smaller steel members. In both cases, the results are achieved without increasing the loads for which the columns were designed.

Development such as recounted by Mr. Manning is an outstanding example of what may be accomplished by a progressive industry. The structural steel fabrication industry, banded together in the Canadian Institute of Steel Construction, is contributing by its research and studies to the solid bulk of scientific achievement.

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The Institute recently published a booklet in which the following advantages were claimed for steel construction.

No building material approaches steel in strength. A laterally supported, solid steel column 3½ miles high will support its own weight without crushing. A steel chain, hanging in tension, would be 18,000 feet long before its weight would break the topmost link.

Structural steel is the only building material that will determine the load carried, when within the elastic limit, by the amount of deflection, automatically and exactly; and the only building material that will regain 100% of its original condition when stressed within the elastic limit, upon removal of the load.

It is the only material that resists compressive and tensile stresses to an equal degree and, to a slightly lesser extent, those of shear and torsion as well.

Steel has the ability to meet every kind of stress, or a combination of all of them, with more strength than is possessed by any other material.

Steel affords the greatest and most certain resistance against every type of strain.

Steel comes to the job ready for construction —ready to be erected immediately. Every member is a unit with a definite position in the structure and it can be placed in its proper position without delay. Steel construction moves rapidly, saves time and field labor.

Land value is purely potential until it is improved by a revenue-producing structure. Delay causes loss on the investment. A building that can be completed quickly brings earlier returns on the capital and saves interest charges that would otherwise grow big during the process of construction. Taxes and other items of overhead, as well as interest, are liabilities until the structure is completed and occupied. Compensation to the owner is therefore contingent upon the completion of the building at the earliest possible moment.

Structural steel buildings are fabricated in the shops without interruption due to weather or other causes, during which time existing buildings are demolished, excavations made, piles driven and footings or caissons completed for the foundations, so that the erection of the steel frame may start at the site as soon as the foundations are ready to receive it.

The erection of the steel frame proceeds more rapidly than any other type of fire-resisting construction. No matter what weather conditions are encountered the erection will go ahead as long as men may work. No costly protection from freezing is necessary. The hottest temperatures will not effect it. Steel construction proceeds unimpeded from the Arctic to the Equator.

The maximum usable space in a structure, i.e., floor area or cubical storage space, can be attained when all the structural parts are reduced to the least number and size. This can be done by using that material which possesses the greatest compactness and strength.

The reduction in weight of the material also decreases the size and

(Please turn to page 85)

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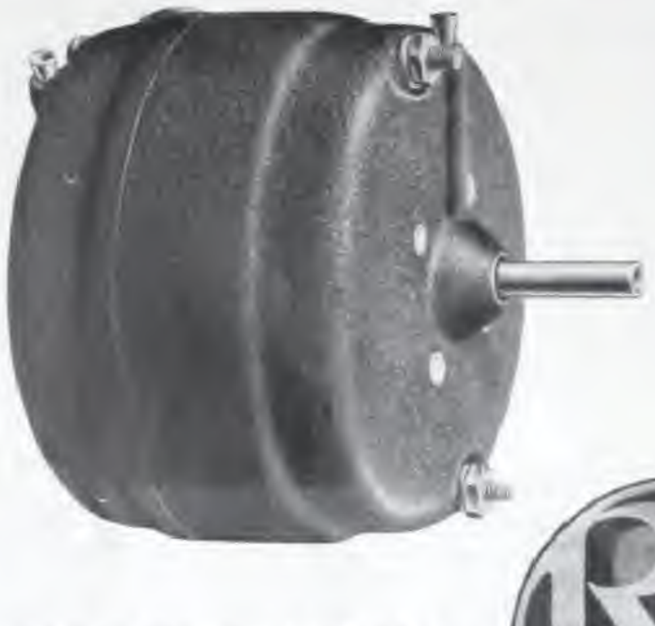

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number of the foundations, which are important elements in building costs.

Steel columns and beams occupy less space, consequently interiors will be larger, with construction members less conspicuous. Increased floor space with better lighting and ventilating facilities, secures a better class of tenants, satisfied to pay higher rent for those advantages. It is indispensable for theatres and auditoriums where columns must not obstruct the vision.

The compactness of structural steel facilitates rapid and economical construction. No false work, staging temporary supports or forms are necessary. Structural steel goes into place cut-to-fit, complete, self-supporting. Workmen have the full use of floor space as the work proceeds.

Structural steel will last indefinitely. Bridges and other steel structures exposed to air and moisture require only cleaning and painting at intervals. The consensus of opinion among the leading engineers is that no steel structure, which has reasonable attention, has ever been seriously affected by corrosion.

Steel cannot be harmed by freezing; its expansion or contraction under heat or cold is a known fixed, invariable attribute. There can be no "temperature cracks," no "contractions due to setting," no disintegration, no change in its initial strength due to the effect of time.

Structural steel does not have to be warmed, protected, or kept moist in order to acquire or retain its strength. Structural steel members need no protective coverings or housings during erection. Excessive changes in climatic conditions will not necessarily impede, enhance the cost of, nor prevent the erection of steel.

When it becomes necessary entirely to demolish a bridge or building of structural steel the original material may be re-used even in altered shape, due to its high salvage value. Structures built of other materials not only have little or no salvage value, but in many cases the cost of demolition is actually more than the first cost of the structure.

No other building material has such high salvage value, can be so economically recovered, or is so readily marketed after recovery. This is not a theory, but an easily provable fact. Hundreds and thousands of steel bridges and buildings, having outlived their usefulness in their original position, are now giving perfect satisfactory service in new locations and under changed conditions.

A recent survey of the Canadian structural steel industry revealed that the industry has a capacity of 30,800 tons of finished shapes per month. The total number of workers in the industry is 11,300 and the area of floor space occupied is 2,871,320 square feet. These figures cover 26 plants which are members of the Institute out of a total of 29 plants.

Steel, one of the most versatile peace time building materials, has earned new laurels for its suitability in the swift tempo of war time construction.

The Enduring Beauty of Brick

(Continued from page 25)

for 12-in. walls as the minimum. No walls are unbraced in a dwelling. The floors, partitions and corners are usually sufficient to give ample lateral stability.

Standards of Strength

The American Society for Testing Materials, in its standard specification for bricks, gives the following table of strength requirements:—

Name of Grade	Compressive Strength Lbs./sq. in. Mean Gross Area Mean of 5 Tests	Compressive Strength Lbs./sq. in. Mean Gross Area Individual Minimum	Modulus of Rupture Lbs./sq. in. Gross Area Mean of 5 Tests	Modulus of Rupture Lbs./sq. in. Gross Area Individual Minimum
Grade A	4500 or over	3500	600 or over	400
Grade B	2500 — 4500	2000	450 or over	300
Grade C	1250 — 2500	1000	300 or over	200

Heat Transmission in Winter

Like all masonry walls, the transmission of heat from the inside to the outside of a brick wall is comparatively high. An 8″ wall without lath and plaster will conduct away .5 heat units (British Thermal Units) per sq. ft. per hour—with a temperature difference of 1 degree between inside and outside. A 12″ brick wall will conduct .36 BTU.

However, such walls are always furred and plastered so that this coefficient is usually reduced to .32 for an 8-in. wall and .24 for a 12-in. wall. Thus, if the base temperature outside is assumed at zero and the inside at 70 degrees, the number of BTU to be lost per hour per sq. ft. of wall will be 22.4 for an 8-in. brick wall, and 16.8 for a 12-in. wall.

This can again be cut down by applying insulation to the interior of the wall. The insulation can be protected from dampness in order to preserve its efficiency. A good coat of asphalt paint may be applied to the interior brick surface before a loose type of insulation or rock wool is used between the plaster and the wall. If this is done, then a thickness of 1⅝ in. of rock wool reduces the coefficient of a brick wall to .13 for an 8-in. wall, and to .12 for a 12-in. wall. If metal foil is used, dividing the air space between plaster and brick, the coefficient will be reduced almost the same amount.

The use of a good ½-in. insulating board reduces the coefficient of a brick wall to .22 for an 8-in. wall, and to .19 for the 12-in. wall.

Walls of porous bricks laid in lime mortar and poorly built actually allow air to leak through in a wind. It has been calculated to amount to 7.85 cu. ft. per sq. ft. per hour in a 15-mile wind. Hard brick, cement mortar and good workmanship reduces this figure by a third. Plaster applied to the wall reduces it to .0666 cu. ft. per sq. ft. per hour. Thus there was a great deal of common sense used by our ancestors when they covered the north side of the brick house with stucco.

Fire Proofness

Fire tests by the United States Bureau of Standards indicate that an 8-in. solid brick wall affords sufficient insulation against spread of fire in residences. During the first two hours of the test, in no case did the temperature on the opposite side of the wall from the fire reach a point where it could ignite combustible materials. It should not be forgotten, however, that fire can be transmitted through the window openings.

Brick Sizes

There is no building material unit that has remained over so long a period of years as uniformly standard in size as bricks. The varieties of brick sizes are many but they have all been within a very limited range. In England, the bricks used in Little Wendam Hall in 1260 were 9 in. x 4½ in. x 2⅝ in. The modern standard English size is 8⅞ in. x 4 5/16 in. x 2⅝ in. This is a remarkably small variation for a period of 682 years.

Brick sizes vary somewhat in various parts of Canada. The most commonly used, and standard in Ontario, is 8⅜ in. x 4 in. x 2⅜ in. In Quebec and the Maritimes the standard brick is somewhat smaller—8 in. x 3¾ in. x 2¼ in. This is the same size as the standard United States brick. It is impossible to make bricks exactly to size and the American Society for Testing Materials, Standard Specification C34-36 permits a variation in size of 3 per cent plus or minus.

The reasons why bricks have remained about the

Interior of Our Lady of Perpetual Help Church, Ottawa, and a corridor in the new Protestant High School, Quebec, showing the use of B.P. Flexible Tile Flooring.

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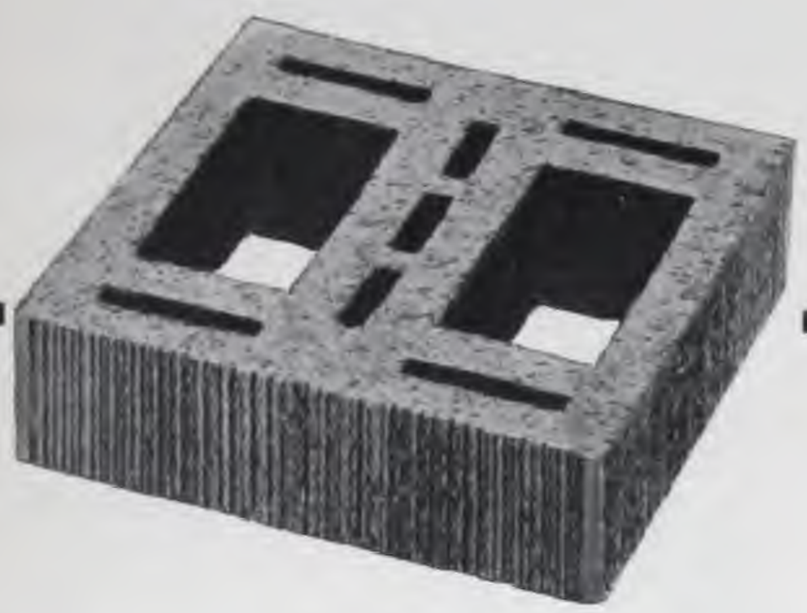

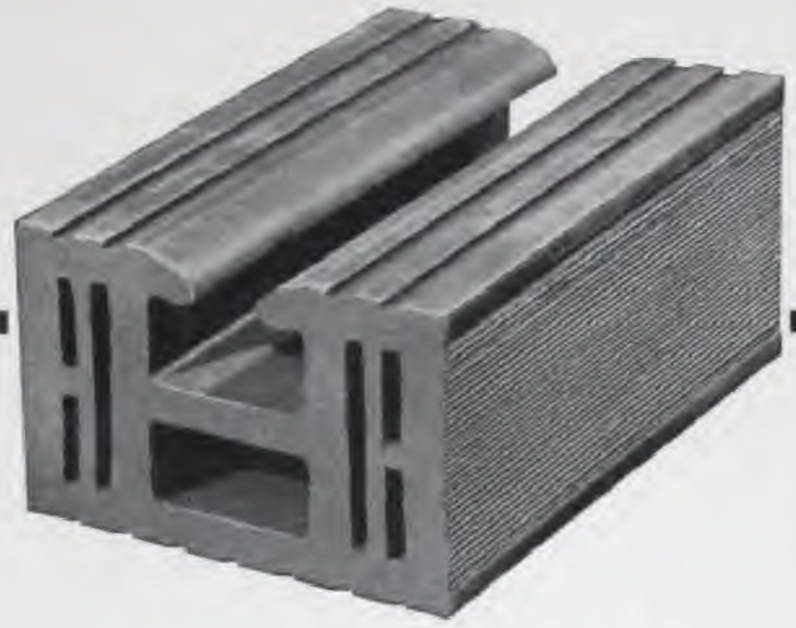

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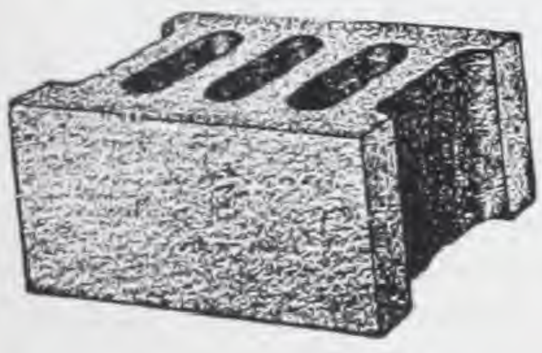

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same size are functional. The width of a brick is determined by the normal grip of the average mason. If it is wider than 4½ in. it cannot be picked up easily and laid in mortar with one hand.

The length is double the width, so that even bonding can be made when built into the wall. A sort of module system is thereby established (2 headers plus ½ in. joint equals length).

The depth is determined largely by the limitations of weight. A brick should not be too heavy to lift. Experience shows that it should not weigh over 7 pounds wet. The average Canadian brick weighs about 4 or 5 pounds dry.

In recent years the hollow brick has found an increasing market due to its lighter weight. The holes in it decrease the weight of the finished masonry so that in steel buildings a perceptible saving in tonnage of steel is possible. The frogs or indentations in common bricks are more a matter of custom than of saving weight. The Dutch do not press them into their bricks, and they have advanced the art of brickwork to as high a degree as any other people.

The sizes of bricks have often been increased. In England, they were at one time made larger—not because of improvement in workmanship but to avoid taxes which were based on the number of bricks used.

The Housing Division Technical Research Department of the WPA in the United States has recently made studies to see whether the size of bricks can be made greater thereby lowering the cost of labor. The bricks in the Hillside development in the Bronx, New York City, were slightly larger than standard (2⅝ in. x 8 in. x 3¾ in.) and it is estimated that considerable saving resulted. So far, these efforts to get the industry to increase the standard size of bricks have just begun to bear fruit.

As long as bricks are laid by hand, their size will be influenced by this limitation but a 20 per cent increase in standard size will not be too much, in view of the size of English brick and estimates of recent government work.

Efficiency methods to speed up the number of bricks laid in a day have been tried out. As far back as 1900 Mr. Gilbreth made photographic studies which illustrated lost motion in brick laying and devised methods of improving the procedure in building brick walls and the output of a mason per day, but labor has the final word in these matters.

The average number of common bricks laid in large city work on a 12 in. wall ranges from 900 to 1200 in an eight-hour day. In a country house with an 8 in. wall the number ranges from 800 to 1000 per day.

Kinds of Brick

Modern machinery and the principles of mass production have been operating in the brick industry just as in other fields. The fact that some bricks are still made by hand is largely due to the demand for their textural beauty.

The only method of brick manufacture which

resembles the ancient method is to be found in the soft-clay process. Here wet clay is pressed into brick molds by means of a machine which closely imitates the hand methods. In some plants the hand process is still used. The texture of these bricks is pleasing and the resulting product is somewhat porous. The old Colonial residences of Virginia afford fine historical examples of this type of brick. When sand is sprinkled in the mold to keep the clay from sticking, the bricks are called sand-struck. When water is used, they are called water-struck.

The other two methods of making brick are essentially machine processes. The dry-press brick is the product of a machine which applies tremendous pressure to a partially dry clay held in molds. The finished bricks are compact and dense. When they were first made, their mechanical perfection was greatly admired. Thirty years ago they were in great demand. Then a reaction against their hard mechanical appearance took place. Now the changing taste of architects to admire again the mechanical smoothness of machine products may revive their popularity.

The stiff-clay brick which outrivaled the dry-press brick may in turn take a subordinate place. This process makes a rough textured brick. Clay of a stiff consistency is forced through a die or opening in a machine that resembles very closely the ordinary meat grinder. A column of clay issues from it, the width of which corresponds to the length of the brick and the thickness to the breadth. Wires stretched on a frame cut this clay column into brick sizes. Stiff-clay bricks may also be subjected to machine pressure after they have been formed from the clay column. The sand-finish is typical.

After the bricks have been molded by any one of these processes they must be carefully dried to expel the water and then subjected to the fire in kilns. Owing to the unavoidable differences in temperature in different parts of a kiln, some bricks remain softer and more porous than others. That is the reason for the classification of bricks into hard, medium and soft.

The colors which result from clays which burn red, range from the salmon color of the underburned bricks to the very dark red or almost black of the well burned bricks. Clays which burn to a buff color may range from golden shades to dark speckled browns.

Salt-glazed bricks of brownish hue are produced by throwing ordinary salt on the brickware during the final stages of burning.

Glazed or enamel bricks have a permanent, opaque ceramic finish applied to them baked on.

Sand-lime bricks are not clay bricks at all but are made by combining sand and lime under hot steam and high pressure, thus forming calcium silicate. They are durable and compete on a low cost basis with clay bricks for certain purposes.

Common and Face Bricks

There was a day when no distinction was made

★*For Free Inquiry Service please turn to page 5*

between common brick and face brick. Now we distinguish between the two kinds by having two groups of manufacturers. Face bricks, as their name implies, are used on the exterior of walls and are selected for texture, color and durability. Common bricks, on the other hand, are cheaper and are used for building the load bearing walls and for backing up other masonry. Sometimes the common bricks of one part of the country are selected and sold in another part as expensive face bricks.

In England before the 17th Century, when no special distinction was made between face bricks and common, the so-called English bond was used. This consists of alternate courses of stretchers and headers.* It makes a very strong wall, especially when the mortar is poor as it was then.

When the classic style began to creep in, smoother textured bricks were sought by architects. Inigo Jones, the famous English architect of that period, used specially selected bricks to finish the exteriors of the buildings he had designed. Quoting from an old book of the period, referring to the kinds of bricks used: "there are two kinds, viz.: the common or ordinary sort and another sort, which is made with somewhat more neatness, after the manner of a Grey Stock Brick, which are sold a shilling a thousand more than the common sort . . . ."

Because of the added cost of these face bricks, the English architects ceased to use the English bond and adopted the Flemish bond, since corresponding economies in the numbers of face bricks required were noticeable. The Flemish bond using more stretchers than the English bond, reduced the number of expensive face bricks about 11 per cent. The Flemish bond thus became fashionable in England and we find it used in most of our Colonial houses.

Bonds as Brick Patterns

The improvements in the strength of mortar have made the structural qualities of bonds less important. Today most decorative brickwork uses bond motifs as units of design and the headers are usually only half bricks. For example, in the Flemish bond every other brick is a header but when actually built today, only the headers of each third course are full length bricks. When the face bricks are of a different size from the backing bricks, none of the headers may be full bricks but the face of the wall may be bonded to the back only by metal ties at every sixth course.

In structural load bearing walls built of common bricks, bonding headers are used once in every sixth course.

However, most good patterns in brickwork are derived from the structural Flemish or English bond, the former leading to the greatest variety. The basic unit for all these brick designs consists of a stretcher with a header centered on it in the course above and below. This has been called the brick "eye."

In the Flemish bond, where bricks in each course are alternately header and stretcher, the entire wall pattern is made up of interlocking "brick eyes."

In the English bond, which consists of alternate

courses of headers and stretchers the "brick-eyes" run along the stretcher courses side by side.

On the other hand, the English cross bond or Dutch bond is like the Flemish bond in that it is the interlocking of "eyes" over the entire face of the wall. The "eyes" on one stretcher course fit in between the "eyes" on the next stretcher course. This produces diagonal lines across the wall which do not appear in the straight English bond, and for this reason it is more decorative.

All other patterns or bonds are but variations of the English or Flemish bond. The "eyes" are usually separated by more stretchers. For example, the Flemish garden wall uses two or three stretchers to separate the headers. This spreads the "eyes" farther apart.

Jointing and Pointing

The color of the mortar, the method of pointing and the width of the joint enhance or diminish the effects of patterns in brickwork. There are no rules to follow in selecting the kind of joint. There are a few general observations to be made, however.

It seems that the rougher the brick is, the wider and rougher the joint should be. Also, the smoother the brick, the narrower and smoother should be the joint.

The stiff-mud bricks that have been wire-cut and given a very rough texture seem to require wide joints. They look well with the set-back or the raked joint, which makes deep rough shadows. A wide flush-cut joint, also harmonizes with them, if grit be embedded in the mortar so that as it is cut with the trowel a rough texture is produced.

On the other hand the dry-press bricks which have smooth regular surfaces need a narrow joint that is smoothed with a V-tool or a rod or bead.

The soft-mud bricks which are not too rough in texture or too irregular in shape seem to call for a medium thick joint smoothed with the trowel or with the rod. The trowel joint which is weather-struck seems to go with the smoother varieties.

The range in the width of joints is usually from ¼ in. to ½ in. and sometimes up to ¾ in. and 1 in. The designer must really base his selection upon experience and examples of brickwork already built. Sample panels of brickwork are always necessary to aid in the final decision. A collection of photographs of good brickwork will often help the architect explain to the mason what he is trying to get.

Colored Mortars

Coloring the pointing mortar is also a very delicate artistic problem. Only a sample panel of the wall can finally determine the choice. Colored mortars when wet are so much more intense than when they dry out. The general tone of the whole wall is also greatly affected by the color selected for the joints. An otherwise beautiful brick wall can be ruined by the wrong color in the joints.

Hollow Brick Walls

The purpose of building hollow brick walls for residences is to lower initial costs by using less brick, less mortar and less labor in setting. They

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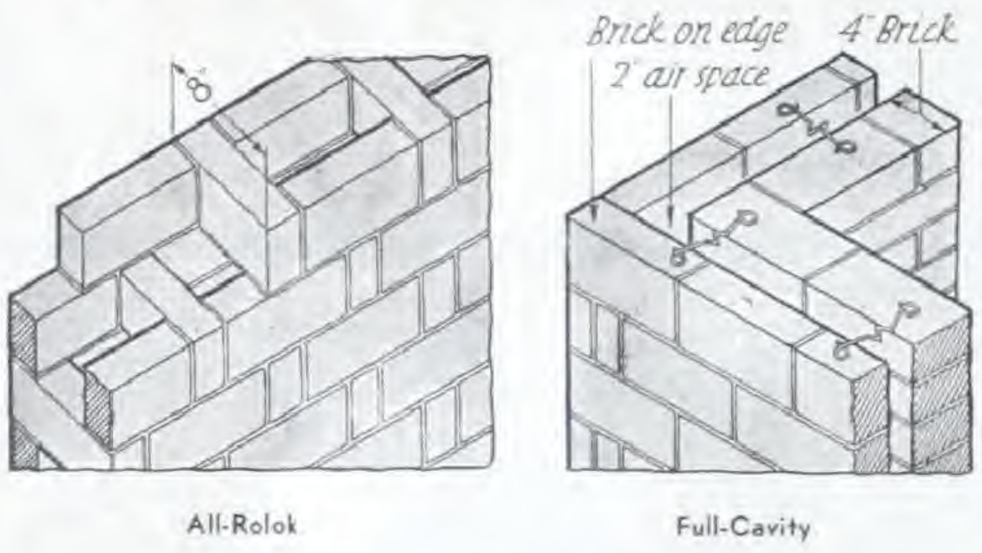
have been used a great deal in England for the last hundred years. The hollow space has a certain insulating value against the penetration of dampness. Its value as a heat insulator is somewhat doubtful.

There are three types of hollow walls: The full-cavity walls the all-rolok walls and the ribbed walls.

Full Cavity Walls. The outer shell is 2¼ in. thick, with bricks on edge. The inner shell is 3¾ in. thick, as the bricks are laid flat. The two shells are completely separated by a 2 in. wide air space, but are bonded together every three courses by wire anchors laid into the joints. The overall width of the wall is 8 in.

The wire anchors should preferably have a kink at the middle of the air space, so that any water which might start to flow across them will drop off before reaching the inner shell. Care should be also taken to prevent mortar drippings from accumulating and bridging across the air space. With the average mason this is not an easy thing to control. The floor joists get their bearing on the interior four inch shell.

All Rolok Wall. The outer and inner shell of this



All-Rolok Full-Cavity

wall is composed of bricks on edge. In each course, every other brick is a bond brick and spans across the air space showing, one end on the outside face and the other on the inside face. The general effect of the wall suggests that a larger brick has been laid up in Flemish bond.

A more usual appearance can be given to such a wall, when the outside face is built with bricks laid flat, making a four inch shell. The interior shell is built with bricks on edge. Every sixth course is a header course bonding the two shells together.

Altogether there are nine variations of the Rolok brick wall. The one described above, with the four inch outer shell, is the one most suitable to house construction.

Estimates have been made to support the claim that such a wall is about 30 per cent cheaper than a solid 8 in. brick wall.

Ribbed-Wall. This wall has not been used very much in this country but has many possibilities of development. It is essentially a wall 4 in. thick, braced at intervals with 8 in. piers which may or may not be reinforced by vertical steel bards in the center. The piers may be designed to come on each side of every window opening and at the corners. Long spaces between windows may require additional piers.

An application of asphalt paint to the interior is considered by some to be necessary to keep out the dampness. A wire lath with a heavy ribbing can be fastened across from pier to pier and the plaster applied directly to it.

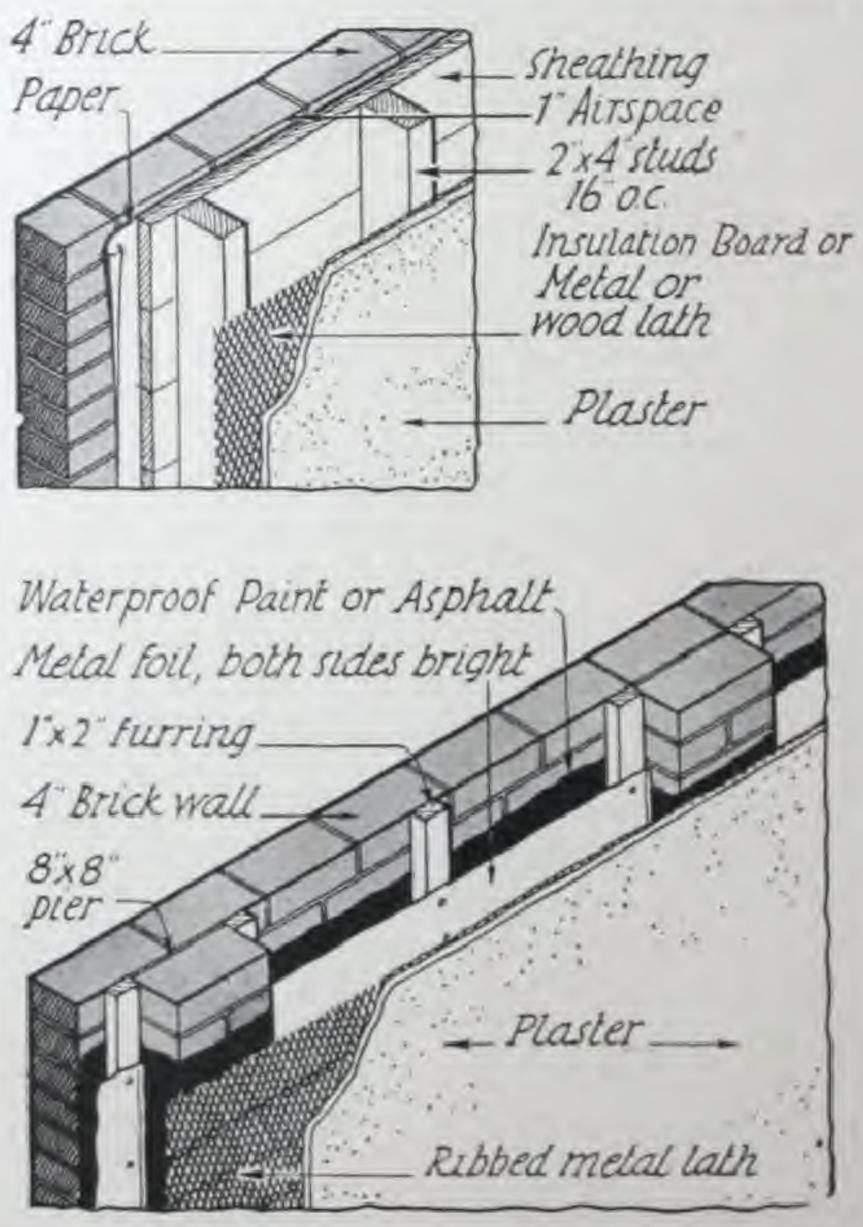
Another method of building this wall is to put the piers on the outside. Then apply furring strips to the four inch wall on the inside. On this can be stretched metal foil, bright on both sides. Then more furring strips are nailed directly over the others to support the lath for the plaster.

Brick Veneers. When it is important to keep down initial costs and at the same time provide for low maintenance costs, the brick veneer over a frame structure presents a number of advantages. No exterior painting of such a wall is necessary and its resistance to external fires is almost as good as an 8 in. solid brick wall.

From the point of view of insulation against heat loss, it has a lower coefficient (.27) as compared with (.3) of the 8 in. wall furred and plastered inside. With a layer of building paper, wood sheathing and an air space between the studs, its resistance to penetration of moisture is perfect.

Another saving to be noted in construction is that the frame can go up to the roof, the second floor and attic joists and rafters can be put on, and the house completely enclosed while the masonry work still goes on. In solid brick construction, the walls must be finished before the second floor joists or roof can be erected.

Against these advantages are to be weighed the



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fact that a brick veneer is non-elastic and is unable to give with the wood frame behind it. If it is rigidly anchored to the frame, cracks in the wall are sure to develop. But by keeping the veneer away about an inch from the wall-sheathing and fastening it with flexible wire anchors and using elastic seam compound in the joints around windows and doors, much of this difficulty can be avoided.

When steel frame studding is used as a backing, none of these objections can be raised, but there will then be no saving on the initial costs.

Hollow Backup Blocks

Face-brick veneer has been extensively used over blocks of terra cotta and cinder concrete. The hollow construction of these blocks makes it possible to increase their unit size, thereby cutting labor costs in laying them up. In 12 in. walls this construction often shows a greater saving than with 8 in. ones.

The air spaces in the hollow blocks offer resistance to heat loss. The coefficient for an 8 in. wall backed with a 6 in. hollow block, furred, lathed and plastered is .24.

In all hollow block construction, care must be taken to caulk the joints around windows with elastic cement and to flash with roofing felt over lintels through the entire thickness of the wall. It is safer to fur the inside of these walls the same as any solid walls, but plaster has been applied with success over a good coat of asphalt, directly to the back of the hollow blocks.

On the inside of openings less than four feet wide, the facing of the wall should be supported on steel angles.

Openings wider than four feet should have lintels of steel, reinforced brickwork or reinforced concrete. Usually two angles back to back are sufficient for the ordinary openings. The sizes of these angles can be selected from this table:

Sizes of Angles to Support 4 in. thick Brickwork

3 in. x 3 in. x ¼ in.	for spans up to 8 ft.
3½ in. x 3½ in. x 5/16 in.	" " " " 9 ft.
4 in. x 4 in. x 5/16 in.	" " " " 10 ft.
4 in. x 4 in. x ⅜ in.	" " " " 11 ft.
6 in. x 4 in. x ⅜ in.	" " " " 15 ft.
6 in. x 4 in. x ½ in.	" " " " 16 ft.

Where floor beams bear upon the wall directly over openings, then the additional loading must be added and computations made for larger lintels. These usually consist of two channels, face to face with an angle to support the face brick.

Weather Precautions

During warm or dry weather all bricks should be thoroughly wet just previous to being laid. This is to insure the presence of enough water in the brick, to prevent it from drawing water out of the mortar which would prevent proper setting and bonding.

When the weather is below freezing and is dropping, the work should stop or artificial heat be provided constantly. If the temperature is rising and is hovering around 28 degrees the work can proceed.

Bricks should be laid dry in the winter. For best results the mortar should be warm so that it may have partially set if a freeze should set in.

It is common practice in our northern climate to build upon frozen brickwork for small dwellings. However, if the temperature continues low, care should be taken to prevent the brickwork from alternate freezing and thawing.

The code regulations of the National Board of Fire Underwriters say: "All masonry shall be protected against freezing for at least forty-eight hours after being set. Unless adequate precautions against freezing are taken, no masonry shall be built when temperature is below 28 degrees F. on a rising temperature or below 32 degrees F. on a falling temperature, at the point where the work is in progress. No frozen materials shall be built upon."

Permanent Planting for Maximum Results

(Continued from page 29)

is concerned. No shade tree should ever be planted closer than thirty feet from a house and it should be kept in mind that flower gardening, and even grass, are out of the question under heavy shade.

The reader will be wondering what is to be done for shade on the city lot measuring fifty by a hundred and fifty feet. My opinion is that the verandah, the summer house, and the umbrella, are the proper means of obtaining shade for such small gardens. If a shade tree is considered essential a dense growing species of limited size, such as the Norway Maple, should be placed in the middle of the lawn, so as not to interfere with either the house or the plantations on the boundaries.

Where shrub and evergreen planting must remain dwarf, and this applies, not only to foundation planting round the house, but also to most of the permanent planting on the city lot, material must be chosen that will, either remain permanently dwarf, or else consist of a type that can be kept dwarf by pruning. We are all familiar with the garden that receives its annual hair cut where the shrubs are solid round globes or else a lot of sawed off stumps with suckers coming up all round from the bottom. This is merely the result of an attempt to keep unsuitable material from growing out of scale with the garden.

The list of shrubs that will never exceed two or three feet in height, or that can be satisfactorily kept down to that size, by pruning, is extremely short. The overwhelming majority of shrubs such as Lilacas, Bridal Wreath, Honeysuckle, Mock Orange and Golden Bell are grown for bloom and for the beautiful spread of their foliage, when allowed to develop naturally to their full height of eight to fifteen feet. Heavy pruning each year must destroy both bloom and shape. Any such attempt at control will destroy their natural beauty. Two shrubs, however, that adapt themselves to heavy pruning, each spring, are the summer blooming, and fall blooming, Hydrangeas both of which can be kept permanently down to three or four feet and still preserve shape and bloom.

For the really permanently dwarf deciduous shrubs we have, in the order of their importance, the two prostrate Cotoneasters (praecox and adpressa) seldom rising to more than two feet; the green and purple Japanese Barberries reaching four feet; the silver-leaved Kerria; Spiraea Anthony Waterer; Deutzia gracilis; and the dwarf Viburnum (V. opulus nana) a very dense and compact low shrub invaluable for foundation planting.

By far the best of our local broad-leaved evergreens is the Korean Box. This remarkable evergreen shrub seems likely to attain immense popularity in the near future as it seems to possess almost all the qualities desirable for both golfers and gardeners. Reaching an ultimate height of not more than two feet it will grow well under almost any conditions including city smoke and heavy shade. It is not subject to pests and appears to be able to withstand almost unlimited cold. For a dwarf clipped hedge it is unsurpassed. In November the foliage turns a rich greenish bronze but with the first warm days of early April it takes on again its usual brilliant green.

Another broad-leaved evergreen shrub that is due for great popularity presently is Euonymus Carrieri. Although not as hardy as Korean Box it does extremely well in Southern Ontario. Of dense globular form it reaches an ultimate height of about three feet. In exposed situations the foliage may go a little brown during cold winters but the shrub soon recovers in spring. It will withstand both city smoke and shade.

The better known evergreen Mahonia or holly-leaved Barberry remains evergreen in selected sheltered sites. Any exposure however causes the foliage to turn brown in early spring but the shrub is quite hardy and the beautiful new foliage soon compensates the owner. The two Yuccas (filamentosa and glauca) maintain their rather exotic green foliage throughout the winter.

In this fine conservatively designed home the architect has relied upon a roof of Barrett red square butt asphalt shingles to lend warmth to the stone walls.

MacLean Building Catalogue

A Review of Wartime Housing

By JOSEPH M. PIGOTT
President, Wartime Housing, Ltd.

Wartime Housing Limited have built about 6,000 houses like these.

THE Government was made aware very early last year of the necessity of devising some means of providing accommodation for workers in munitions. Few of us realize what a tremendous effort Canada is making industrially in support of the war. We are undertaking the production of things that we never dreamed of attempting a few years ago and producing armament and ammunition, planes and trucks of all kinds, in a volume that even the most optimistic champion of Canadian manufacture could not even have approached in any forecast he might have made two years ago. Naturally, this condition has not been brought about without a serious dislocation of centres of our population.

The first field we had to tackle was the field of survey and study. The second field "construction" and the third field that is beginning to pile up now like the Rocky Mountains is the field of "operation".

Because the cost of this housing was a matter of first importance, we had to work out standard units, so that the factor of repetition would produce the most value for the money. This put definite limits on what might be done to make the houses attractive. Because this housing was temporary and would consequently be removed at some time, it had to be designed so that it could be removed or taken apart with the least possible damage. We had at the beginning of our work last March some preliminary studies made by the National Housing Administration, a section of the Department of Finance, and we started with these types and forms and proceeded with our architects and other experts to develop our standards from there.

We have produced and are using three types of houses. The standard unit, which is about 75 percent of our housing, is a bungalow type 24 ft. x 24 ft. with a large living room 11 ft. x 15 ft.; two bedrooms, one being a double one the other a single; kitchen and dinette. We have a larger bungalow 24 ft. x 28 ft. with the same accommodation with somewhat larger rooms. We use a small percentage of this housing. Then we have a four bedroom house which has, in addition to the ground floor layout of the second house above mentioned, two bedrooms upstairs.

We found early in our career that there was a definite limit to the economies that might be practised at the expense of appearance. The housing projects had to be sufficiently attractive to meet public approval, otherwise we faced unending trouble in securing locations. Obviously, if we were building regimented shacks, no municipalities, and certainly no sections of the municipalities would have been very happy. I think those of you who have seen any of our finished houses will agree that they are very attractive. The result has been that we have had a minimum of opposition to their location. I can assure you that this result was not obtained without a great deal of study. To begin with, we arrange our houses so that they do not fall into the monotonous rows that usually prevail in most low cost housing developments. We have men to lay out the streets and the relation of the houses one to the other who get the most out of the plan. Then we vary the finish on the houses, using as a rule about one-quarter wood shingles; one-quarter plywood or weatherboard, as it is called; one-quarter wood siding and one-quarter Cedar-Grain (or asbestos) shingles. Then we use different colored shingles on the roofs. We mix the types of houses up and by these methods we obtain the most in the way of variety.

Houses Are Removeable

As to the removability of these structures, they are put together in sections which have been standardized as far as it is possible and practical to do so, into units about 4 ft. x 12 ft., which are bolted together. Then the outside and inside finish is applied. When the house has to be removed, these finishes are removed and the structure comes down in sections. Since they are all standard panels, the re-erection is very simple. The houses are built on posts. The

walls, floors and ceilings are thoroughly insulated to meet the particular climate of the locality. They are heated by a type of stove which, in combination with the kitchen equipment, keeps the house very warm indeed.

These houses range in cost from approximately $1650.00 low to $2100.00 high for the standard 24 x 24 ft. house, depending on the number of units involved and to a large extent on the location. The average price of the standard house would be approximately $1800.00. This by no means represents the cost of the project per unit, for, as you will readily understand, we are not building houses so much as we are building towns and villages. When you consider that it is possible to place only 7 or 8 houses on an acre of ground and that most of these projects run into many hundreds of houses, you will see that we have to start from acreage and build our streets, lay out our sewers, water pipes; arrange for power and light, etc., not to mention the expense of acquiring the property, the surveying and engineering services involved.

Competitive Tenders Invited

Once it has been decided to start a project, we issue plans and specifications to all contractors who might be interested in tendering, endeavoring to secure as many bids from responsible concerns as possible. Then, in all cases the work is awarded to the lowest responsible bidder. When additions are made to the program, for instance, when 200 houses are added to 300 already under contract, we negotiate with the construction company presently on the job for these extensions at more favorable prices and we find that the use of existing buildings, jigs plant and personnel now familiar with the construction, results in quite substantial reductions. We cannot be sure that this will continue, because, as we all know, certain costs have been increasing lately and this is bound to be reflected eventually.

Wallboards are much in favor for finishing or remodelling attic rooms. Photo courtesy International Fibre Board Ltd.

After we make our recommendation a suitable site must be secured. There are a number of important factors involved in selecting a site. We first endeavor to get improved property, for we have found that the improvements, such as streets, sewers, and water are almost invariably worth more than the property. We endeavor to get Crown property. If that is not available, we try to get municipal property—loaned to us when fully improved or deeded to us when we have to make the improvements. I am happy to say that wherever we have found such property, we have received the fullest co-operation from the municipalities. Only when these sources fail do we purchase. Wherever there is any difficulty about the price or the clearing of the titles, the transaction is placed in the hands of the Canadian National Right-of-Way Department, with whom the Government have a general arrangement. This has been a great help and convenience to us, because we are always able to get possession in a matter of a day or two.

Local Architects Supervise

The contract having been awarded, a supervising architect is appointed. It has been considered sound policy by our company to secure the services of a local architect qualified to supervise the project. Here again the architects have been valuable to us. They receive but a very low return for their services; the schedule calls for 1 percent and we are assured of proper administration by those who know what they are doing and a check on the work at all times. We have, of course, a small staff of our men, which again, in turn, supervises the architects.

In order to be certain that we are receiving the full benefit of mass purchasing, we have made the following arangements. We enjoy the same unit prices negotiated early in the war by the Department of Munitions and Supply for such materials as fibre board, gypsum products, asphalt products and lumber prices through the Timber Control. In addition to this we have negotiated national bulk purchases for all our plumbing and millwork. All these prices are handed to contractors when preparing their bids, so that we are assured that such economies as are naturally present in mass buying are reflected in price. But, what is equally important, we arrange for our material in advance, so we are sure of getting it.

Our work extends from Halifax on the East Coast to Prince Rupert on the West. So far it involves approximately 6000 houses, a score of staff houses and dormitory buildings and involves approximately $16,000,000; most of this has been spent. We are building these projects in over thirty centres. The smallest project is 50 houses and the largest 1000 houses and 13 dormitory buildings.

Community Development

When we have the houses built and occupied and the men's dormitory buildings or centres, the rents coming in and maintenance work organized, there are still large problems involved in the operation of

them. I am convinced that from a community standpoint these developments will take one of two roads —if they are neglected they can become serious social problems which will make for trouble, or, on the other hand, if responsibility in this direction is recognized and the proper effort and study put into it; a little money spent; these projects can and should form happy communities, which may well serve as examples for general community development, so that when we are through, we will have placed something quite substantial on the credit side of the ledger besides "wartime houses".

There is presented an excellent opportunity to ascertain what can be done along these lines with a new community which is really a small town or village, consisting of several thousands of people, all of whom are practically strangers to one another. It is not the intention, nor is it necessary, to molly-coddle these people or to be guilty of any form of paternalism that will mark them off from the rest of the citzens. It is our idea that community effort can be brought about by quiet promotion amongst the people themselves. We are starting with a city in Ontario, where we are erecting 800 houses. There we have secured the co-operation of the city. We are taking a field of some 12 acres right in the heart of our development and tying it in with their playground system. We are starting with the children. We have engaged the services of some two or three who are experts in the field of community work, people who have studied matters in relation to the home from various angles, not the least of which is community life and the possibilities of community improvement and interest. We will proceed quietly and slowly with the work in the city in question and as soon as we have some of our ideas and methods in operation, we will repeat them in other centres. The first difficulty that has to be overcome is the inclination of committees and administrators to view efforts of this kind as a lot of nonsense. However, I think I am as hard headed as the next man and I have a number of men associated with me who are not given to frivolous experiments and we believe it is a very important part of our work. We are convinced that, having built these houses and having put thousands of people into them, that it is not going to be possible to wash our hands of our responsibilities and allow these communities to work out their own social conditions.

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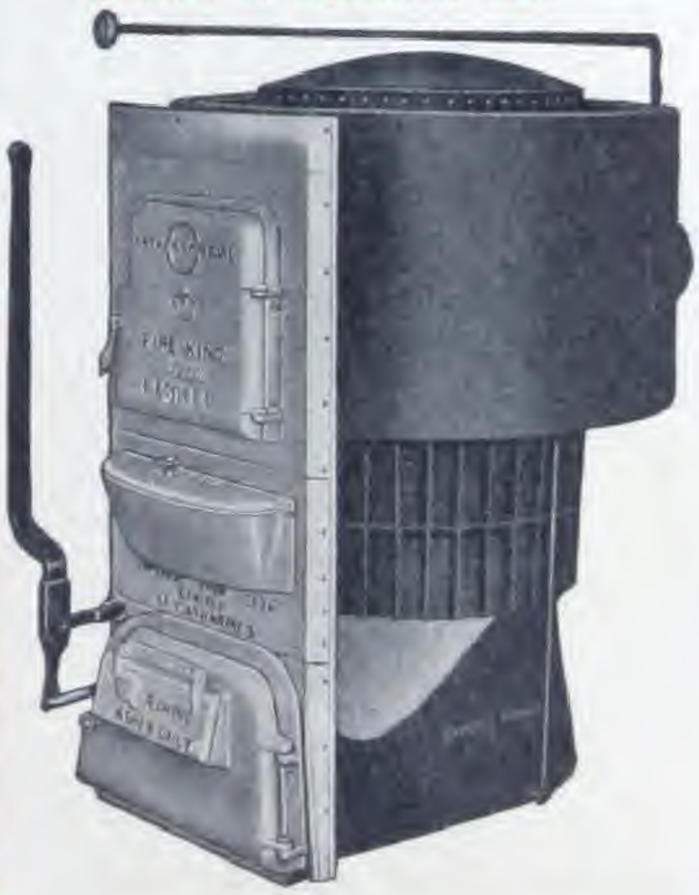

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